

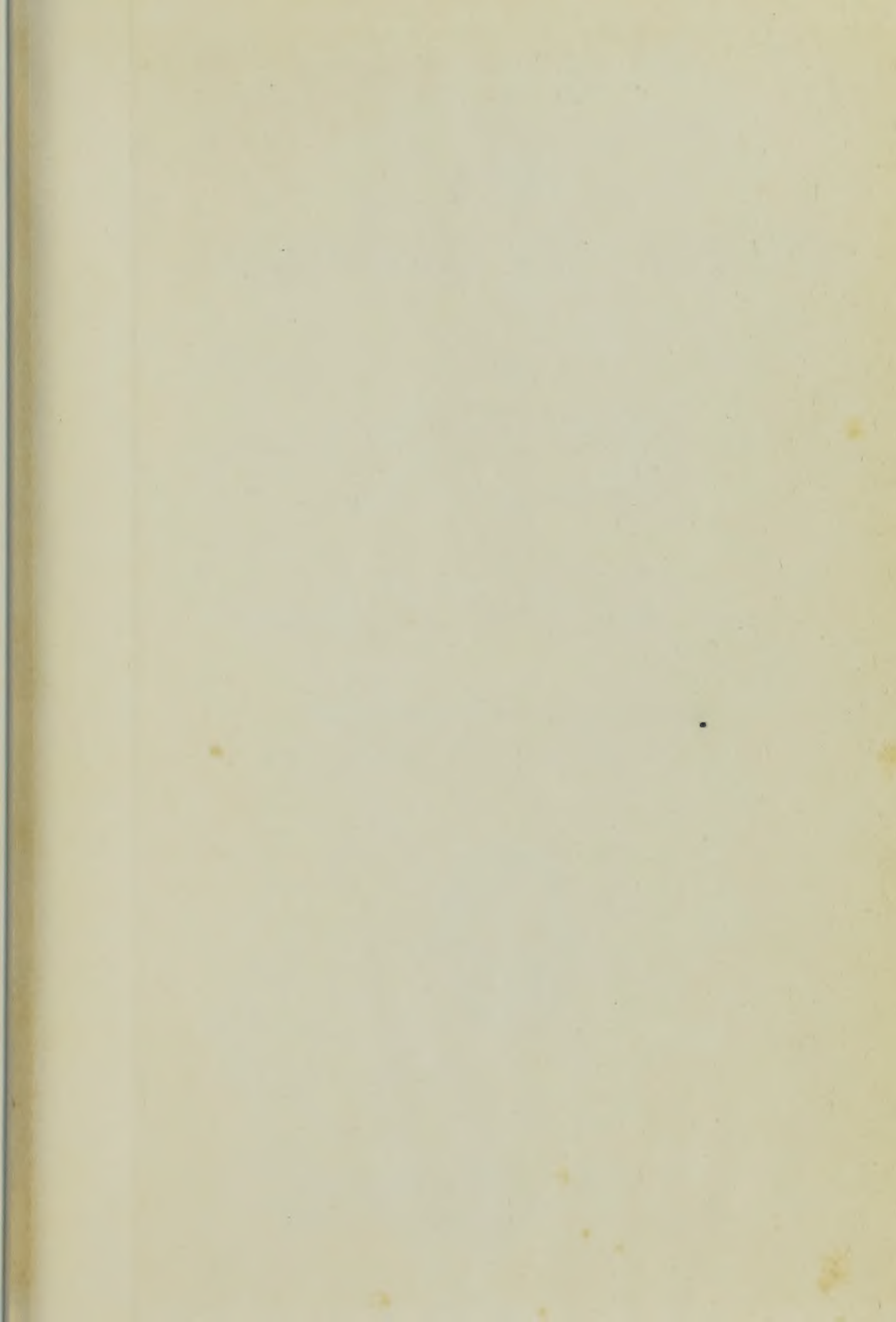
THE
HIGHROAD
TO
HEALTH



ANDRESS · BROWN · POWER

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CANADIAN HYGIENE SERIES

THE HIGHROAD TO HEALTH

BY

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PREFACE

This volume introduces the pupil to the spirit of science in relation to healthful living. It is fair to assume that when pupils have reached the junior high school or corresponding grades they have acquired considerable information about health and have also formed many of the fundamental health habits. Both the acquisition of worth-while information and the formation of health habits should continue, but the pupil should now cultivate a deeper spirit of inquiry and a scientific attitude toward health problems. In a field in which there are so many cults, and so much misleading and even harmful tradition and superstition, the development of a scientific attitude would seem to be the next logical step.

The authors have approached this problem by presenting to their readers some rather unusual information about health and disease prior to the time when science had developed. The futility of superstition is pointed out. The spirit and method of modern medicine and hygiene are also suggested in the lives of great health heroes like Leeuwenhoek, Pasteur, Lister, Koch, Trudeau, Reed, Noguchi, Goldberger, and others. These men were not only scientists, but citizens of the world who devoted themselves with zeal to the public welfare.

The scientific temper, however, is primarily the result of actually engaging in scientific work. J. Arthur Thomson has brought out this point admirably in his excellent essay, "The Scientific Mood." "What is demanded,"

says Thomson, "is within the reach of all who will habituate themselves in making sure of the facts, in precision of statement, in getting things clear, and in realizing the complexity of all situations. These qualities cannot be acquired passively; the kingdom of science must be taken by force. The scientific mood can only be engendered by one being actively and energetically scientific." For this reason the content and spirit of the text are intended to help develop a scientific attitude by leading the pupil to consider facts and draw conclusions.

Although the scientific method and mood are to be among the highly desirable outcomes of the study of this book, the teacher needs to remember that the health of the individual pupil is the goal of greatest worth.

With this end in view the teacher will find it profitable to know something about the mental and physical handicaps of her pupils, and, so far as possible, to work with pupils and parents to remove remediable defects. But health education is something more than the prevention of disease and the removal of defects. It should be wholesome and inspiring, with definite emphasis on positive health — on living in such a way that one's energy may be conserved and spent with the greatest satisfaction and efficiency.

The authors are grateful to the many teachers and authorities on health who, both directly and indirectly, have helped to make the text more accurate and teachable. They wish especially to acknowledge their indebtedness to Mr. L. A. DeWolfe, Miss L. W. Vrooman, and Miss Dora Baker for their criticisms and suggestions.

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THE HIGHROAD TO HEALTH

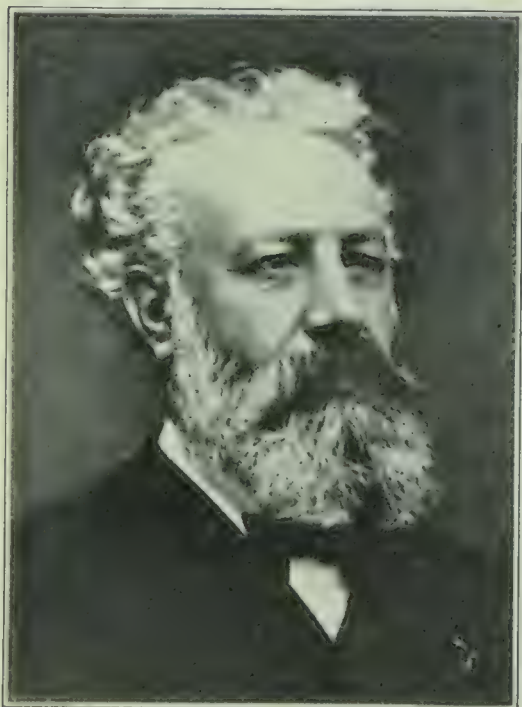
CHAPTER I

THE WONDERS OF SCIENCE

1. **The charm of fiction.** It was about sixty years ago that Jules Verne wrote his remarkable book entitled "Twenty Thousand Leagues under the Sea." It caught the popular fancy and was widely read by young and old throughout the civilized world. This book described the mysterious voyages of a submarine boat and startling discoveries in the plant and animal world in the depths of the sea. Another book by the same author was "Around the World in Eighty Days."

Half a century ago people who read these books of Jules Verne smiled at his apparent exaggerations. "Yes," they said, "his stories are interesting, but they are only fiction after all." Yet Jules Verne had anticipated in imagination discoveries and inventions that would greatly change the world. But even he, with one of the most brilliant imaginations of all time, could not foresee how quickly a new age was to be ushered in and how it would eclipse in many ways his most fantastic dreams. Boys and girls who read his books today may even find them somewhat commonplace. The real world has marched on in the last sixty years.

2. Truth is stranger than fiction. The world is changing so rapidly that even current fiction may lag far behind actual achievement. The morning paper may tell us of a new discovery or invention that will revolutionize a belief of a lifetime.



JULES VERNE

The great French novelist who anticipated many modern discoveries and inventions

In the days of Jules Verne circumnavigation of the globe in 80 days seemed a remarkable feat, but we have lived to see the dirigible *Graf Zeppelin* complete a flight around the world in 21 days, in 1929, and the giant airship *R-100* cross from England to Canada in 2 days, 8 hours, in 1930. New records for speed are made and surpassed from week to week. Captain Mollison flew from London to Capetown, only to see his wife, Amy Johnson

Mollison, lower his record to 4 days, 6 hours. Air travel between Australia and England is linked with the name of Hinkler, who in his brilliant career established so many records, and with that of Kingsford-Smith, who reduced the time to 10 days in 1930. In motor-boating Kaye Don attained a speed of 110 miles per hour in 1931, and Sir Malcolm Campbell pushed his motor car to 274 miles per hour at Daytona Beach in February, 1933.

How time and space have been conquered since Wolfe and Montcalm sailed to New France! The ships of those days were slow and uncertain. It took three months for such craft to cross the Atlantic. Today the *Empress of Britain* makes the trip in four and one half days.

In the lull of peace following the Napoleonic wars, the conveyance of His Majesty's mails between England and Canada presented real difficulty. To improve upon the old 10-gun brigs then in use, the *Royal William* was built at Quebec, whence she sailed to the Isle of Wight in 1833 — the first boat to cross any ocean entirely under her own steam. And to one of her creators, Samuel Cunard of Halifax, N. S., and his partners, the British Government five years later awarded a contract for mail service via steamboat, two sailings monthly between England and Canada. Thus, out of the necessity for mail service between the mother country and Canada arose the new order of ocean travel by steam-driven boats.

Transportation on land has also shown gigantic progress from the old stagecoach to the services of the Canadian National and Canadian Pacific railways.

But progress has not been confined to transportation. Through the Canadian Radio Commission's Dominion-wide hookup regular and special radio programmes may be heard now equally well from Halifax to Vancouver, from the Great Lakes and the Prairies to the outposts north of the Arctic Circle.

This is a remarkable age. It is an age of skyscrapers, submarines, aeroplanes, dirigibles, phonographs, safety razors, radios, electric lights, steam and hot-water heat, gas stoves, vacuum cleaners, and other wonderful inventions. Many diseases have been conquered, and life has been lengthened. Life has been made more comfortable

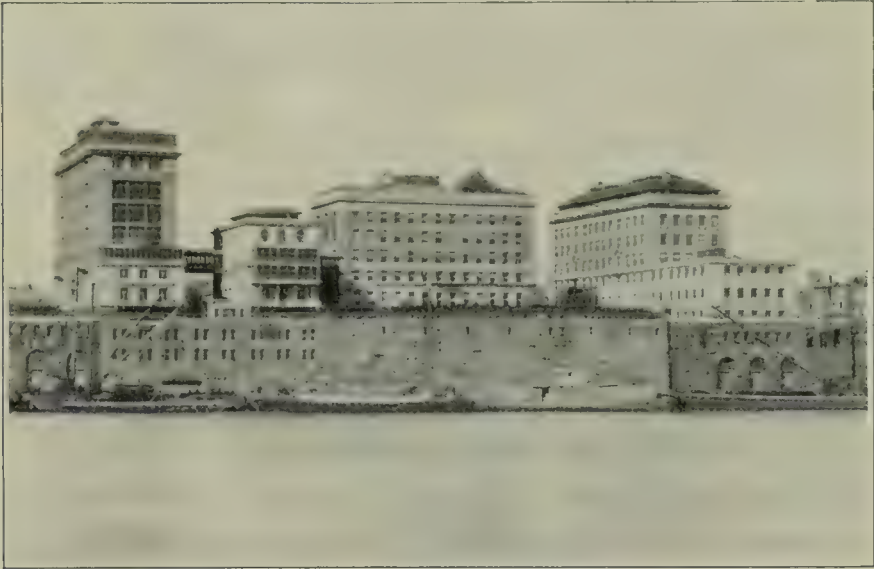
and in most ways safer. Such progress has been made that today the ordinary Canadian workman enjoys many comforts and opportunities that were denied kings and queens a few centuries ago.

3. Science the wonder-worker. What has brought about this remarkable change in the world? There is but one answer, — science. This is a word from the Latin, meaning "to know." The most essential thing about science is knowledge, but not all knowledge is science. The ordinary person knows something about mosquitoes, — that they bite and may carry malaria; but to the ordinary boy or girl every mosquito is about like every other mosquito, while to the scientist a particular mosquito is one of a particular species, or group, having certain characteristics. He calls it by its group name and knows whether it is male or female, how it lives, and whether it carries disease. The scientist wants to have his facts classified. He would have a pigeonhole for each fact.

Some scholars are interested in the gaining of knowledge for its own sake; they are not concerned about its being useful to humanity. Such study is often referred to as pure science. Others are intent on finding out how this knowledge may be made useful to the world. This body of knowledge is known as applied science. There is no sharp difference between the two. Nearly all pure science eventually becomes useful.

There seems to be little connection between the sun, over ninety millions of miles away, and the dirigible balloon floating among the clouds. Yet there is a very close connection. One day scientists discovered a new gas, helium, in the sun. Later this gas was discovered on the earth. Meanwhile the dirigible balloon had been made quite successful except that the ordinary hydrogen gas

which was used to inflate it was inflammable. In warfare it often caused an explosion. Since helium was very light and could not burn, it might be used in dirigibles with success. Then began the adventure of searching for it in every conceivable place. Finally it was found in sufficient quantities. In this way pure science had become useful.



THE ROCKEFELLER INSTITUTE

A famous scientific institution noted for its remarkable discoveries in medicine. (Courtesy of the Rockefeller Institute)

Scientists are interested not only in collecting facts and classifying them but in discovering relations between them. They try to find causes. When science was still in its infancy it was noted that malaria was found in low, damp, marshy regions. It was natural to think that low land was the cause of malaria. Scientists had not dreamed that the presence of the mosquito was important. Finding the mosquito guilty was one of the most brilliant discoveries in medicine. Before science had begun, chance observations had shown that in a number of cases people

who had touched toads had had warts later on, and a great many people came to believe, and still believe, that warts are caused by toads. As men began to learn more about the body, and observed more carefully, they found that this was untrue.

A growing body of classified facts and a knowledge of causes gives the scientist increased power in the world. It enables him to predict what will happen. He may predict a coming storm, an eclipse of the sun, or a flood. Knowing the cause of a given disease and the way in which it is carried, he may find the source of an epidemic and conquer it or prevent its coming.

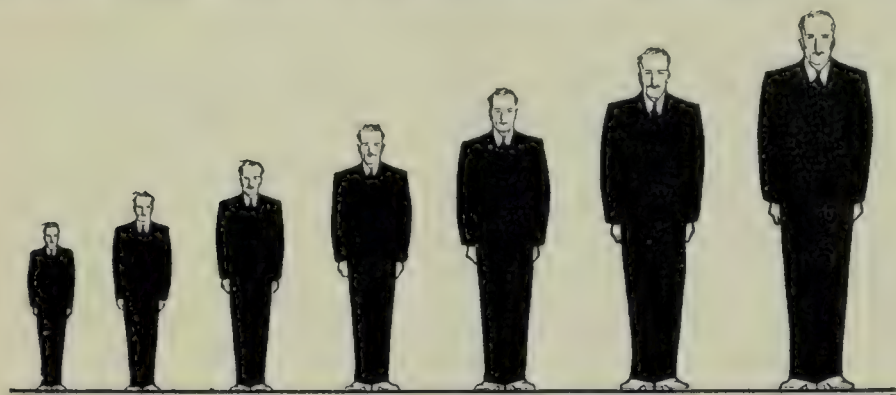
This increasing body of reliable information and knowledge of causes has made man a wonder-worker. It has enabled him to construct bridges, build giant ships, light cities, increase the products of farms, preserve food, and lessen the number of hours of labor.

Science is a wonderful power. It may help to save life and make the world a better place in which to live, or it may help to destroy life. The World War, for example, witnessed the application of science to destroying life on a colossal scale never dreamed of before.

4. Science in the service of health. The story of the contribution of science to health is fascinating. With the growth of science the average length of life has been increased, and many diseases have been conquered. In Great Britain people are living longer than ever before. According to the census the average length of life is fifty-eight years. Within the last seventy-five years the average duration of life has been increased about fifteen years in many of the nations of the world. It is believed by many health experts that with the further applications of science to the problems of health twenty

years more may be added to the average length of life. You may help to bring this about in Canada.

Glancing back into the past, we notice that the average length of life was 20 to 25 years; in the England of a century ago it was 40 years, and at present it shows, according to Sir George Newman, Chief Medical Officer of the Ministry of Health, an increase of 18 years; in other words, a baby born in England today may expect to live



THE AVERAGE LENGTH OF LIFE IS RAPIDLY INCREASING

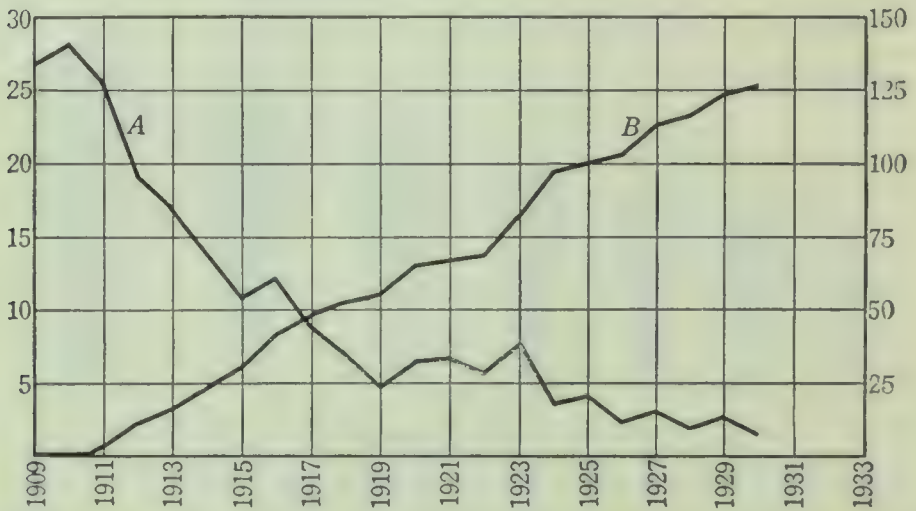
This is one of the greatest scientific achievements of the last century

58 years. Effort for the improvement of the health of the people is well worth while. In ancient Rome, without the science of health, the average life was about 20 to 25 years.

As a result of the growth of science many diseases have almost disappeared. That they have not been more successfully combated is due to people's ignorance of the teachings of science, or to their laziness or indifference. Typhoid fever, for example, is far less common today than it was twenty years ago; smallpox is far less common today than it was fifty or a hundred years ago. Professor Caldwell has well said: "We need not have the smallpox unless we prefer *not* to do the things

which science has shown will prevent disease." Concerning typhoid he says this illness "is so well understood and its transmission so definitely associated with uncleanness that we shall soon see the day when it will be not only unfortunate but not respectable to have the disease."

5. A land where there is no science. In those lands where there is little knowledge of science and its relation to



HOW SCIENCE HAS REDUCED THE DEATH RATE FROM TYPHOID IN ONTARIO
IN TWENTY-ONE YEARS

Notice the relation between the decline in the number of deaths from typhoid with the increase in the number of water-purification plants using chlorine. *A* represents the typhoid death rate for 100,000 population (at left); *B* represents the number of municipal chlorination plants in operation (at right). (Courtesy of The Department of Health of Ontario)

health, smallpox, fevers, and other diseases are likely to be common. Illness and lack of progress are marked. This is true of many of the South American and Central American countries. Wherever science has been applied, health and the saving of life have resulted. The Panama

Canal Zone is in the tropics, and previous to scientific control it was one of the most unhealthful places in the world. Scientists have now made it more healthful than many northern cities.

In far-away Zululand in Africa there is no knowledge of science. Data are lacking in regard to the average length of life in that country, but the beliefs and practices of these people are interesting as compared with our own. All the misfortunes of the world are supposed to be due to evil spirits. Good health depends on protecting one's self from such spirits. This is accomplished by getting the help of the medicine man or witchdoctor. When consulted he puts on a mask, to make him look wise, and performs various ceremonies to drive the evil spirits away.

Dr. Philip A. E. Sheppard, a dentist, who spent many of his vacations among the people of Zululand, says that he has occasionally extracted teeth for the members of the tribe.

It has always been an occasion of festivities, with the immediate members of the kraal and their dogs admitted. All joined in chanting and singing and clapping of hands, while the dogs contributed their share in the concert most lustily, the



© Ewing Galloway

AN AFRICAN WITCH DOCTOR IN HIS
MASK, PAINT, AND FEATHERS

His people believe that he can scare away the evil spirits that cause disease

underlying idea of all this being that the patient would not feel pain. At all events, even if he did, they have made sufficient noise to satisfy or frighten the spirits, and the evil after-effects have been warded off.

Among the Zulus, according to Dr. Sheppard, good health is indicated by the power to sneeze. Sneezing thanks are offered to the spirits of ancestors upon occasion. Lucky is the



THE BARBER POLE

It is a reminder of a time when superstition ruled

time spent in sneezing, and on occasions the natives will suspend all operations for a time for a sneezing festival. To induce the pleasurable explosions, a kind of snuff is used. It is the custom of witch doctors to sneeze quite a bit during their divinations, and this indicates that the spirits are present and propitious.

6. The romance of the barber's pole. Everybody is familiar with the striped pole that stands in front of nearly every barber shop. Although few people, even among the barbers themselves, know it, this white pole with red stripes tells a strange story of that historic past before the science of modern medicine began. Several hundred years ago barbers were also surgeons. One of their

functions was blood-letting. It was believed at that time that nearly all human ills were due to a bad condition of the blood. A loss of blood was supposed to bring relief or to effect a cure. To bring this about, leeches, or blood-suckers, were often applied to the patient by physicians. The surgical function of the barber was to cut the flesh with a lancet to allow the blood to escape. The red stripe

on the barber's pole advertised the barber surgeon and stood for the bandage with which he stopped the flow of the blood. Some of the barber surgeons were very clever in their work. Frequently they were called upon by the people of highest position to aid in the cure of their ailments. It is interesting to read in old novels about blood-letting. The barber surgeons organized themselves into guilds or unions and gained much power. They contributed little, however, to the science of medicine. They continued their work well into the nineteenth century. Even today blood-letting is resorted to by our best physicians for certain maladies, but only after science has proved its value. Although blood-letting is seldom practised today, and only by skilled physicians who are very careful about having clean instruments and bandages, the striped barber's pole remains, recalling that curious age of beliefs and superstitions about the blood. Not only does the barber's pole remain, but also some of the superstitions of the past, such as

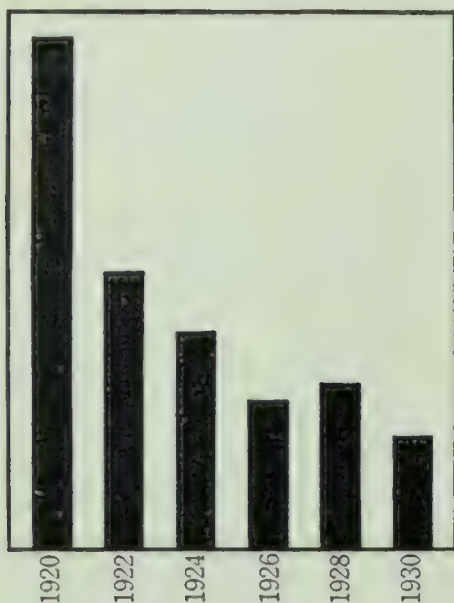
After the cold winter the blood is thick. We need to take medicine to make it thin.

Cereal heats the blood.

Boils are a good thing. They make you healthy because they get rid of bad blood.

Possibly you may know other superstitions about the blood. Make a list of them and then try to find out, by referring to this textbook or to other books or by asking a physician, whether they are true.

7. Our superstitions arose in an age of no science. Among people who have not had the advantage of studying science there are many beliefs about health and disease that are called superstitions. They are based not on science but on an incomplete experience or on imagination, in



DIPHTHERIA ON THE RUN IN
ONTARIO

Science will rapidly reduce the mortality from this disease to the vanishing point

an attempt to explain something which seemed mysterious. Many of these superstitions have been handed down from generation to generation, not by books but by word of mouth. Many of them doubtless go back hundreds of years to a time when our ancestors lived a very primitive life.

Here is a list of some of the superstitions that are still believed by many people today. There may be a slight amount of truth in some of them. After you have studied this book turn back to this page and con-

sider each one. Try to find out whether there is any scientific reason for believing any of them in whole or in part.

SUPERSTITIONS

Wearing red-flannel underclothing keeps away rheumatism.

If you carry a horse-chestnut in your pocket you will not have rheumatism.

A potato carried in your pocket will prevent rheumatism.

We need to take sulphur and molasses in the spring to thin the blood.

An open winter, a full graveyard.

Boils are caused by impure blood.

Boils make one healthier.

Night air is unhealthful.

Toast dries the blood.

Berry seeds cause appendicitis.

Cocoa coats the kidneys.

Oatmeal is heating to the blood and should not be eaten in the summer.

Fruit and milk taken together curdle in the stomach and poison the blood.

A clean tooth never decays.

Eating meat puts a burden on the kidneys.

Cutting your hair at the time of the new moon makes it thick.

Bury a piece of raw meat under the full moon to cure warts.

Burn gray hairs and they will not multiply.

8. Purpose of this book. In the previous pages we have noticed how valuable science is for happy and successful living. In the pages that follow we are going to consider science only in relation to healthful living. Health is so important for our happiness and success that we need all the information on how to be healthy that has been discovered by the great army of scientists. But this book is concerned not only with knowledge about health but with presenting this subject in such a way that the boys and girls who read it may be led to do the things needed for healthful living.

Try This

After reading the previous chapter carefully, try to fill in the blanks in the following composition:

Fiction has ---- many of the wonders of ----. Current ---- often lags behind ----. Modern ---- have almost eliminated ---- and ----.

"Science" comes from a Latin word meaning -- ----. The scientist not only ---- facts but ---- them.

There are two ---- of ----: (1) ---- science and (2) ---- science. Hygiene is an ---- science. Modern preventive medicine and ---- have ---- the average ---- of life. The ----

length of life in ----- now is about ---- years. Through ---- living we may still expect to lengthen life about ---- years. In ancient Rome the average length of ---- was ---- or ---- years.

Science has also given man ---- of disease. No community today need have ---- or ---- if they will do what ---- teaches. Where science has been ---- human life has been lengthened. In those ---- where there is no ---- disease is ---- and the length of life is ----.

Barbers were once ----. In those days it was believed that nearly all ills were due to bad ----. The barber's ---- advertised the barber ----.

Many common ---- about health and sickness are ---- that arose before the days of ----.

It is worth while to know and ---- the laws of ---- living. It will help to make us ---- and ----.

Interesting Things to Do

1. Look up illustrations from literature showing how prominent writers like Tennyson and Jules Verne anticipated scientific discovery and invention.

2. What is the most recent discovery in medicine or hygiene that you have heard about?

3. Try to get some figures from your department of health about the lengthening of life or the mortality from typhoid fever during the last twenty years. Present these facts to the class in the form of a graph.

4. Try to find out how the Indians and other primitive people besides the Zulus battled against disease.

5. Look up some facts about the barber's pole.

6. Add to the list of superstitions on pages 12-13.

7. Write a composition of not more than two hundred words describing the difference between a scientific man and one who merely uses common sense.

CHAPTER II

HOW SCIENCE MAY ADVANCE HEALTHFUL LIVING

9. What health means in happiness and success. The boys and girls who study this book are probably in fairly good health; many of them are in excellent health. Those of you who enjoy good health, — who have a keen appetite, strong muscles, good teeth, a clear complexion, good lungs, heart, and digestion, and a mind trained to do things whole-heartedly and well, — are equipped for the greatest amount of success for which you are capable. Because you are so healthy you may think that the subject of healthful living does not concern you, but this blessing of good health may pass unless you know how to keep your good health and practice the rules of healthful living.

Those of you who do not enjoy good health need to stop and ask yourselves a few questions. The first question might be, "Can I improve my health?" The answer should be, "Certainly." Almost everyone can improve his health, and some people may have almost perfect health. This will take time, patience, knowledge, and willingness to do the things that are necessary. There are many examples of boys and girls who have done this. Then there have been others, like Robert Louis Stevenson, with incurable disease, who have so well cared for themselves that they have lived long and done their work well.

Another question worth answering and easily answered is this: "Is health worth while?" The answer again is, "Certainly." Good health is the foundation of everything

worth while. The healthier you are the better is your chance to succeed. Laws of some countries will not allow children to go to work until they pass a good physical examination. Certain defects disqualify one to enter certain trades and professions. The railroad engineer must have good eyesight, for upon the keenness of his vision

depends the safety of scores of lives and thousands of dollars' worth of property.

Success in almost any field, whether in trades, professions, or recreation, like athletics, requires health. To be successful in anything one must have the capacity and the willingness to do hard work. Edison is quoted as saying that success is 1 per cent inspiration and 99 per cent perspiration. Yet the ability to do hard work also depends on health.



HEALTH HABITS INVITE YOU TO
SUCCEED

The person who is in ill health or who is not in excellent health suffers from a handicap. Picture to yourself two people walking along the road called success. The first has a heavy pack on his back marked "The handicap of ill health." He is bent over by his heavy load and looks very tired and discouraged. The other individual has no load on his back. His shoulders are broad, his back straight, his eyes bright. What long, swinging steps he takes. How fast he travels. He is without the handicap of ill health. Is there any doubt as to who will reach the

top of yonder hill? In all probability the one with the pack will never get to the summit unless he can lighten his pack or get rid of it entirely.

10. **Keys to health: knowing and doing.** There are two things which we need in order to acquire and retain good health. The first of these is knowledge about the things that promote good health. It is here that science may make its contributions, based upon the many careful experiments and investigations that have been made. In those countries where knowledge about healthful living has made greatest progress there has been the greatest improvement in healthful living; in Zululand the medicine man administers to his patients the most disgusting medicines, because he is ignorant of science.



BAD HABITS AND ILL HEALTH
HINDER SUCCESS

But, important as the knowledge about health may be, some people are healthy without possessing much of this information, because they were born with good bodies and have practiced more or less unconsciously the laws of healthful living.

Accurate and scientific knowledge about health is helpful only when people act in the light of that knowledge. Science may tell us what to do to be healthy; the responsibility of such doing depends upon ourselves.

What are the specific requirements for healthful living?

11. **Nutritious food.** One of the most important needs for healthful living is the proper amount and quality of food. Before there had been any scientific study of foods it was said that appetite was a sufficient guide. This



ONE OF OUR HEALTHIEST HIGH-SCHOOL
GIRLS

Medical and health experts gave her first honors. Why shouldn't she look happy?

statement is still made by people who are ignorant of the latest developments of science. Appetite might be a sufficient guide if it were trained in childhood and if there were always a chance to get the right kind of foods. As it is we find children and adults who refuse the vegetables so necessary for health and who eat large quantities of candy and pastry. Following the appetite often means having a finicky appetite, which is detrimental.

So many studies have been made on animals and human beings that we now know a good deal about the essentials for a good diet. Many pages of this book will be devoted to this subject. Let us note briefly the three essentials of the most satisfactory diet as suggested by Dr. McCollum.

1. His studies show that the consumers of dairy products have been healthy and progressive peoples. It was

probably this kind of diet that made the pastoral folk so superior to other people. We are now drinking less than a pint of milk a day per person in Canada. This amount of milk should be increased to one quart. Coffee and tea, especially for children, should be eliminated.

2. The diet should be liberally supplied with leafy vegetables, such as lettuce, chard, and beet tops. The leafy vegetables provide the body with valuable minerals and growth material that cannot be supplied adequately from the milled products, tubers, and muscle meats that are so popular in our diet.

3. Dr. McCollum recommends the consumption of a certain amount of raw vegetable food daily. This prevents scurvy and makes for health. Fruit and vegetable salads are especially valuable.

When these three requirements have been fulfilled, one may safely eat white-flour products, tubers, root vegetables, sugars, and meats.

12. Fresh air. Human beings require air to breathe. All scientists are agreed that outdoor air is best, and that indoor air is good so far as it is like outdoor air. It was once thought that indoor air was inferior because human



DR. E. V. MCCOLLUM

© Bachrach

Distinguished scientist and authority
on foods

beings breathe out so much carbon dioxide and other poisons. Many experiments now show that this is true only in part. The air which we breathe in should be free from dirt and disease and should be moist so as not to irritate the delicate lining of the nose and throat, but the air surrounding the body must be at the right temperature



RECREATION IN THE FRESH AIR AND SUNSHINE PROMOTES
HEALTHFUL LIVING

for comfort and health. Men have been confined in air-tight cabinets, and they began to suffer after a short time, but this discomfort ceased when the temperature was reduced. It was found that one could work comfortably in one of these cabinets if a fan kept the air in motion. Such experiments indicate that the discomfort which one suffers in a crowded room is due to the overheating of the body. About 68 degrees is the proper temperature for homes and school buildings. Everybody should try to get as much outdoor air as possible.

13. Sunlight. Not only can the body keep the proper temperature more easily out of doors, but it also has the advantage of sunlight. The study of the effect of sunlight is one of the latest and most fascinating studies of science. Its importance was first recognized in connection with rickets. It was noticed that children who were exposed to the rays of the sun did not have rickets, and that rickety children, when exposed to the sun, rapidly improved. Children suffering from tuberculosis also rapidly improved when treated by sunlight. Experiments on many animals showed that sunlight is a necessity for health. The sunlight that comes through glass, however, loses its healthful properties in large measure. This is another reason why everyone should get out of doors daily.

14. Exercise in the open air. Over half of the body is made of muscles which enable us to do things, — to work and to play. Therefore it is quite necessary for us to keep them in good condition. If they are not used, they become pale and flabby. So many people today live in cities and are engaged in mental and sedentary occupations that they neglect to use the large muscles of the body, such as the abdominal muscles. Such muscles may be exercised by special exercises in the gymnasium, but to most people it is more enjoyable to get such exercises in the open air. Nearly all active games make use of these muscles. Exercise makes the muscles stronger, leads to deep breathing, strengthens the heart, stimulates the appetite so that food is consumed with greater relish and in larger quantities, and helps to prevent constipation.

Everybody should spend a part of the day out of doors in play.

15. Taking time for play and recreation. Everybody needs to drop his work entirely at some time in the day and play in the open air or have some kind of recreation, like going to a theatre, listening to good music, or reading poetry. The form of play and recreation should be quite different from one's regular work, so that one may rest the mind and body and thus return to work with greater zest. So far as possible everybody should cultivate some kind of play or recreation in the open air. Photography, sketching, camping, fishing, boating, horseback riding, baseball, tennis, gardening, and bird study are worthwhile interests that would take one into the open air.

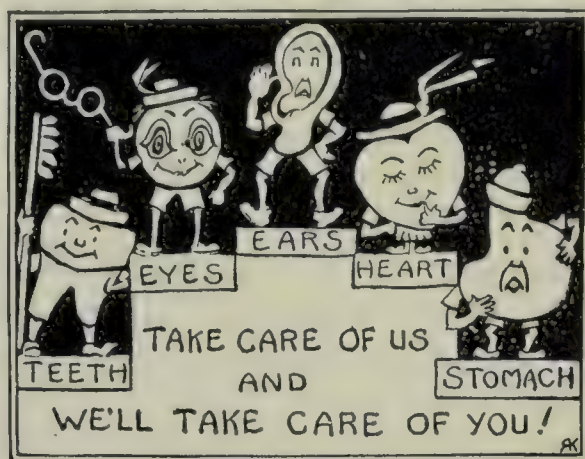
16. Plenty of rest and sleep. To do one's work well and be happy, it is necessary to learn to rest. This is very difficult for many boys who wish to be active all day. While some people need rest much more than others, nearly everybody could profit by having a little rest just before and after meals. This is especially true of those who are under weight.

One of the best habits to form is that of going to bed early. Boys and girls of junior-high-school age should get at least nine or ten hours of sleep every night. This can usually be done if one is careful to plan the day's work and recreation wisely.

17. Standing tall and sitting straight. Good health depends in part on the freedom of the internal organs to do their work. Good sitting and standing postures give the heart, lungs, and digestive system a chance to perform their proper functions. Besides being valuable for health, good posture makes one more attractive. The round-shouldered and bent-over young man or woman does not make a favorable impression in the drawing-room, in the schoolroom, or on the playground.

Poor posture is often due to improper nutrition, over-fatigue, lack of sleep, and general ill health. Sometimes it may be due to careless habits.

18. **Good medical advice.** The body is a wonderful machine which may run for a long time without any serious trouble. Like any machine, it needs good treatment. It is desirable to go to the dentist regularly about every six months, whether you think your teeth need attention or not. In case of illness consult your physician without delay. Just as it is desirable for every owner of an automobile to look his car over from time to time, so it is profitable for



SOMETHING TO THINK ABOUT

everybody to have a good physical examination at least once a year. Some schools give their pupils this annual examination.

19. **Avoiding accidents.** This is a dangerous age. The number of automobiles is increasing yearly, and the danger in crossing the ordinary street is now greater than in crossing a railroad track. There are also many accidents from burns, falls, and cuts. Some of these accidents are unavoidable, but many of them are due to carelessness and could be prevented. For example, many people are hurt or killed every year in boarding cars and trains in motion. Every day one may see a number of people who take chances with their lives. The better way is to

train yourself to look out for your safety and the safety of others. Such habits would do much to prevent accidents.

20. Training to meet emergencies. Since accidents will happen and emergencies will arise, everybody should be trained to do the right thing at the right time. Every summer many people lose their lives while in swimming, but many others are saved from drowning because their companions have been trained to save life. For one's own personal safety it is necessary to know how to take care of cuts, wounds, and bruises.

21. Avoiding illness. It is not always possible to avoid being sick, but the chances may be greatly reduced if one tries to keep physically fit and avoids the possibility of infection. Washing the hands before eating, for example, is one excellent way to avoid catching a cold or other disease. This important subject will be discussed in some detail in the chapters which follow.

22. Keeping healthy mentally. Success in life depends not only on a healthy body but on a healthy mind. Although a healthy body tends to promote mental health, this does not tell all the story, because a person, while physically fit, may form habits of dependence, laziness, and refusal to face difficulties, that will later cause him much pain. Chapter XII will offer suggestions in detail.

23. Health habits are like money in the bank. Learning the principles of healthful living will have no value unless they are practised. The only way to practise these rules with regularity is to keep doing them so constantly that after a time they are done without thinking. If we can remember to go to bed every night at nine o'clock, it will finally get to be a habit. When such habits are formed, it seldom is necessary to think about health. We then do, without thinking, the things that will make us healthy.

A person who has formed such habits has something that is as valuable as money in a bank. How much money have you in the health bank?

Try This

After reading each of the following statements, write a short sentence that will give the best reason why you think each of the statements is true. Let the members of the class compare. Which reasons are the best? Why?

1. Health concerns everybody.
2. Nearly everybody can improve his health.
3. Health is one of the fundamentals of success.
4. Our health depends in large measure on the habits we form.
5. The appetite is not always a good guide.
6. Ordinarily the most important quality of the air we breathe is its temperature.
7. Exposure to sunlight is desirable for health.
8. Good health requires the exercise of the muscles.
9. Recreation should be different from one's regular work.
10. It is desirable to rest a little before and after meals.
11. Bad posture may be due to other bad habits.
12. It is a good plan to visit the dentist every six months.
13. Most accidents are preventable.
14. Everybody who studies this book should know how to take care of a cut.
15. The use of an individual towel prevents disease.

Interesting Things to Do

Make a list of the health habits which should keep you well and make you grow as you should. Plan to practise some of these habits until they are formed.

CHAPTER III

VALIANT HEALTH KNIGHTS

24. A challenge to man. Since the beginning of history illness and death have been a challenge to man. They have inspired his fear, resourcefulness, and courage.

At the beginning all was mysterious, but primitive man craved some explanation for sickness. Since science had not begun, he resorted to imagination and superstition. Early man was interested in the prevention of disease. Early in history, for example, it was known that water had something to do with disease. Cyrus the Great of Persia, in his great military campaigns, took water from home for his army. The Greeks and the Romans made some progress in medicine, but superstition still held on. Even as late as the seventeenth century Sir Kenelm Digby suggested as a remedy for fever that the physician "pare the patient's nails, put the parings in a little bag, hang the bag around the neck of a live eel and place the eel in a tub of water."

Amid the gloom of the Middle Ages disease flourished. Great plagues swept over Europe. This was to go on until science could tell what caused disease and so cure and prevent illness.

Beginning with the seventeenth century there was light. Now enter the lists a long line of heroes who often lost their lives in the battle for humanity. The story of this conquest of disease — a conquest which is still going on — is one of the most fascinating stories of civilization.

25. The man with the microscope. Strange to say, the first of these valiant knights that laid the foundation for modern medicine and hygiene was not at all interested in health, and died without knowing how much he had done for the world. He was a Dutchman named Leeuwenhoek (pronounced lā'vən hōök), who was born in 1632 among the brown wind-mills, narrow streets, and sluggish canals of Delft. His family were basket-makers and brewers, — trades highly honored in those days. His father died at an early age, and his mother sent him to work in a dry-goods store in Amsterdam. At twenty-one he married and started a dry-goods store of his own. For twenty years little is heard about him except that he was appointed janitor of the city hall at Delft and that he developed a passion for grinding lenses. Leeuwenhoek was not an educated man. He did not know Latin or Greek. He knew only his native Dutch tongue, despised at that time by scholars. He was not in contact with cultured or scientific men. Yet there was one thing that he could do, and that was to grind lenses. He went to spectacle-makers and apothecaries and everybody who might be able to tell him something about making



LEEUVENHOEK

One of the first of the health heroes.
He became famous because of his discoveries with the microscope

lenses. For twenty years he labored unknown to the rest of the world. For fame? No. He worked just for the fun of seeing through a lens things that he could not see with his naked eye. His neighbors looked upon him as a crank and made fun of him, but he went on running his store, looking after his janitor work, grinding lenses, and peering long hours at the strange things under his microscopes, until finally he had the best lenses that had ever been made.

Our hero was as curious as the most curious child you have ever seen. He would look for long hours at the hair of a sheep, the scales of his own skin, or the legs of an insect. There was almost nothing that he did not examine. After he had found things not once but dozens of times or even hundreds of times, he wrote down very carefully what he had seen. One day — perhaps the greatest day in the history of science — he put a drop of stagnant water on the needle of his microscope and looked. There under his lens was something that mortal man had never seen before, — little creatures swimming and cavorting around. There was a new world of tiny creatures that had lived and battled and died unseen of man from the beginning of time. It was an exciting moment, — as exciting as that minute when the watchman on the lookout of one of Columbus's ships cried out "Land! Land! Land!" and America was found.

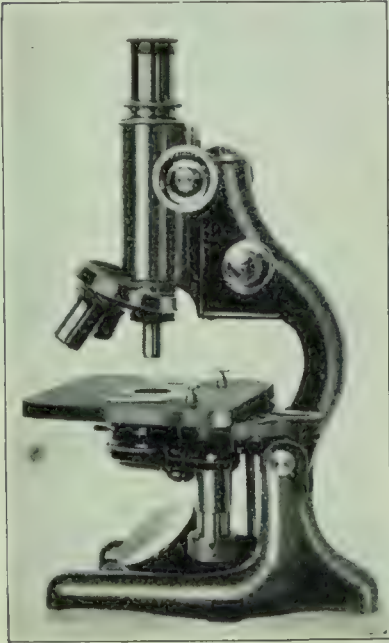
With Leeuwenhoek began the story of the hunt for microbes, or germs. Every minute that he could get he hunted for microbes. He found them everywhere, — in his food, in the water, and even in his own mouth. Curiously enough, after he had been drinking very hot coffee he could find no microbes in the scrapings of his teeth. He tried many experiments. After he found these agile

little particles swimming around in water, he heated the water until it was quite hot. Then he put a drop of the water under his microscope. Lo and behold, the microbes had stopped their running to and fro. He cooled the water, but they did not come back to life. Leeuwenhoek had made a great discovery, namely, that *heat kills microbes*.

The intense curiosity of Leeuwenhoek led to other interesting observations. One day, as he was looking through a microscope at the tail of a fish, he noticed that the blood in the tiny arteries divided and subdivided into smaller and smaller hairlike tubes, and that these came together again in larger tubes and made the veins. The tiny microscopic tubes connecting the arteries and veins were finally called capillaries (from the Latin *capillus*, "a hair"). The great English physician Harvey had already discovered that the blood circulated (went around the body, from the heart back to the heart), but he was entirely at sea as to how this was accomplished. Leeuwenhoek's work, along with that of another scientist, Malpighi (māl pē'gē), solved the mystery by showing that capillaries connect the arteries with the veins.

Meanwhile the achievements of Leeuwenhoek began to be noised abroad and finally reached the ears of the Royal Society of England, who invited him to write to them about his discoveries. Those were curious letters, in which the writer, in an unpolished Dutch tongue, rambled along, telling about his own health, the remarks of his ignorant neighbors, and some of the current gossip; but sandwiched in between these remarks were pithy observations about the wonderful things he had seen under the microscope. For fifty years Leeuwenhoek sent these remarkable letters to the Royal Society.

Finally all Europe knew of the strange doings of the Dutch janitor and storekeeper. The Royal Society made him a Fellow and sent him a gorgeous diploma in a silver case. Peter the Great came to see him. The Queen of England came all the way to Delft to see the wonderful sights to be seen under his microscope.



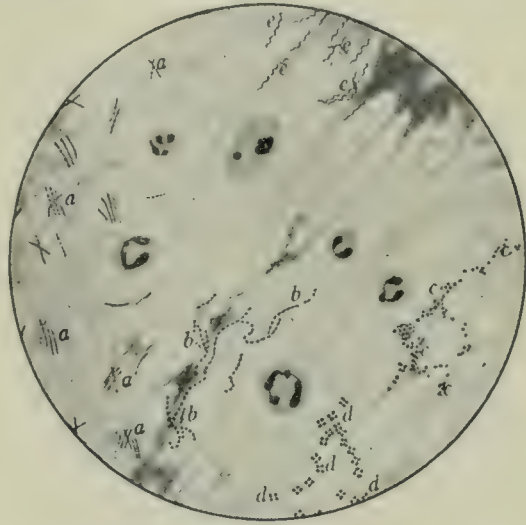
A NEW WORLD WAS REVEALED
THROUGH THE MICROSCOPE

Leeuwenhoek lived to be ninety-one, and he was a student to the last, always studying the strange life under his lenses. Yet at the time of his death he was little more than Europe's great showman. Microbes were merely curiosities. Nobody seemed to have any idea how directly this previously unknown and unseen world affected man, — that most microbes were friendly, that some could be harnessed and made to do much of man's work, and that others were assassins bent on destruction.

26. Interesting facts about microbes. When Leeuwenhoek discovered microbes, he thought that they ought to have arms, legs, mouths, stomachs, and brains. Although he tried constantly to improve his lenses, he was unable to see these parts. Today we know that microbes are quite different from other forms of life with which we are familiar. They have none of the special organs found in the higher plants and animals. Unlike the human body, which is made up of vast numbers of cells, they are one-celled organisms. Under the microscope they sometimes

look like little bits of jelly. They are so tiny that fifteen millions of millions of a particular kind would weigh no more than an ounce; yet these tiny forms are able to perform all the functions of life. Some of them are so tiny that they cannot be seen with the most powerful microscope that has yet been invented; but although they are ultra-microscopic, yet in spite of their tiny size these little organisms breathe, take food, throw off waste products, and grow.

Some of the microbes are little animals, but by far the greater number are little plants and are generally called bacteria. There are three great groups of bacteria, classified according to their shape. Some are spherical, like minute berries. They are called



BACTERIA AS SEEN UNDER THE
MICROSCOPE

a, bacilli; *b*, *c*, *d*, cocci; *e*, spirilla

cocci, from a Greek word meaning "berry." Another group includes all the bacteria that are rod-shaped. Under the microscope some of them look like long, thin sausages, while others are thicker and shorter. They are the bacilli, from a Latin word (*bacillum*) meaning "stick" or "rod." The third group are elongated, like the bacilli, but they are curved and twisted somewhat like a coiled spring. They are called the spirilla, from a Greek word meaning "coil."

27. Do microbes have parents? The microbes discovered by Leeuwenhoek might have been forgotten for a long

time if the scientists of Europe had not got into a heated argument about the origin of life. Since microbes and certain lower forms of life were frequently found in decayed material, many people began to believe in spontaneous generation. They thought that life was created not from previous life but from material things. There were most absurd ideas. One scholar even went so far as to publish a recipe for the creation of mice. Some rags and a bit of cheese or grain placed in a corner might be expected to bring forth a flourishing colony of mice where none of these animals had existed before. Beef tea in a jar, if allowed to stand in a warm place for a number of hours, would be found to swarm with microscopic creatures. Meat placed in a box or a jar would soon be infested with maggots.

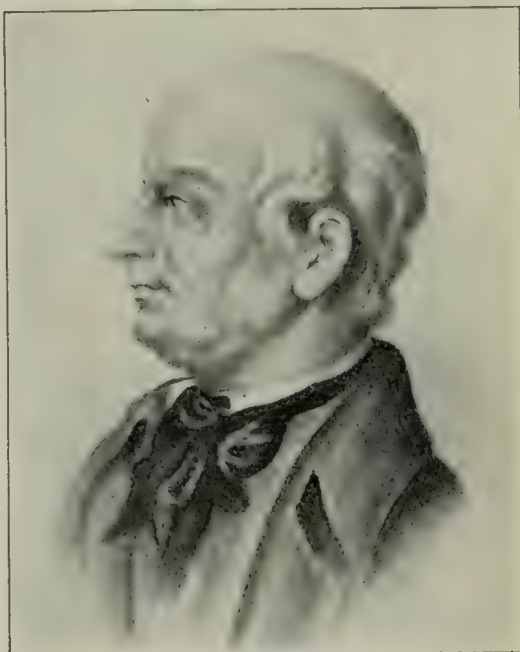
This theory received a severe setback when an experimenter discovered that when a piece of gauze was tied over the mouth of a jar containing decaying meat, no maggots developed. The mother blowfly was attracted to the surface of the gauze, where she laid some eggs. Later these eggs developed into maggots. Such an experiment suggested that life comes from life.

Among the men who took a keen interest in this argument was a scientist named Spallanzani, who was born in northern Italy in 1729. He tried many experiments. In the British Isles another experimenter put some hot mutton gravy in a bottle and plugged it up tight. He even heated the bottle and gravy in the ashes. "Now," he thought, "the little creatures and their eggs are dead." Yet in a few days, when he examined the fluid under the microscope, he found it swarming with life. That seemed to prove that life had been created spontaneously. Spallanzani thought that something was wrong. He tried simi-

lar experiments, except that some of his flasks were boiled for an hour and sealed in an intense heat. He boiled some of those that were sealed for only a few minutes. Others were simply corked. After a number of days he examined the contents of the flasks and found that there was no life in those flasks that were boiled for an hour. There were a few live bacteria in those that had been sealed and boiled for a few minutes. In the liquid that had been simply corked he found swarms of living organisms. This experiment proved that microbes were so small that they could get through the tiny apertures of a stoppered bottle, that some microbes could withstand even boiling, but that no life appeared when microbes were killed by intense

heat. This experiment did much to silence those who believed in spontaneous generation. The many ingenious experiments of Pasteur and others later proved beyond question that life always comes from life.

In his study of microbes Spallanzani discovered a way of isolating a single one. Then he saw a most remarkable sight, the possibility of which had been suggested by another investigator. The little rodlike organism under his



SPALLANZANI

One of the early scientists who did much to prove that all life springs from previous life

lens began to get thin and thinner in the middle. Finally there was nothing more than a little thread, like a spider's, between the two halves. These began to wiggle desperately until they fell apart. Each microbe was a little shorter than the parent microbe, but that was the only difference. As the astonished investigator studied the small microbes they seemed to grow before his eyes until finally, to his amazement, in about twenty minutes the two microbes split up again, so that there were four in all.



THE WAY ONE BACTERIUM DIVIDES AND BECOMES TWO BACTERIA

They multiply very fast. (After Hilliard)

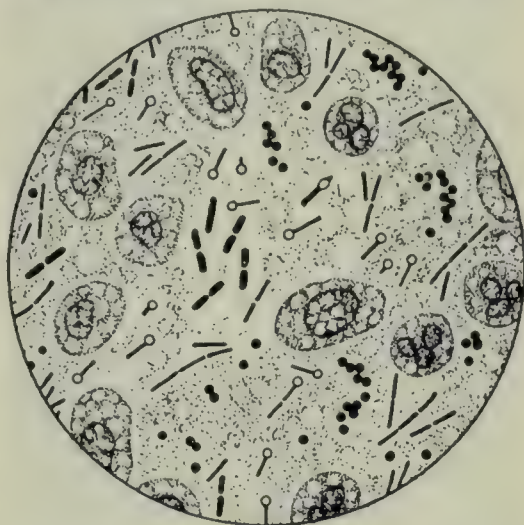
28. Rapid growth of bacteria. It is now known that it is not uncommon for bacteria to divide every fifteen minutes. Such speed in reproduction is entirely unknown in the life of the higher plants and animals. Let us suppose that we are looking at a single microbe. In fifteen minutes, under favorable conditions, there will be 2; in thirty minutes, 4; in forty-five minutes, 8; at the end of an hour, 16. By the end of the second hour the original bacterium would be surrounded by about 256 descendants. In three hours there would be about 4000, and in four hours there would be about 64,000. In twenty-four hours the number would have increased to 78,700,000,000,000,000,000,000,000.

Fortunately this number is seldom if ever realized in nature, because of unfavorable conditions. Extreme heat, bright sunlight, and poisons may kill them. They may also perish for lack of food.

29. Life prolonged by spores. Some of the microbes are able to survive under unfavorable conditions because they develop spores. A spore is a shining mass with a dense

covering, or membrane, which develops in connection with the parent cell. Usually only one is formed in a single organism. It may be placed at the center of the microbe, at the end, or between the center and the end. The germ of tetanus, or lockjaw, produces a spore at one end of the parent rod, which looks like a drumstick. Enough of the life of the microbe enters into the spore to sustain life at a very low ebb. Many of these spores have such resistance that they can survive boiling for several hours, drying, and chemical poisons which would ordinarily prove fatal. Under favorable conditions the spores will again develop as original bacteria and multiply with great rapidity. It is indeed fortunate that those microbes having spores are, with very few exceptions, not enemies to man.

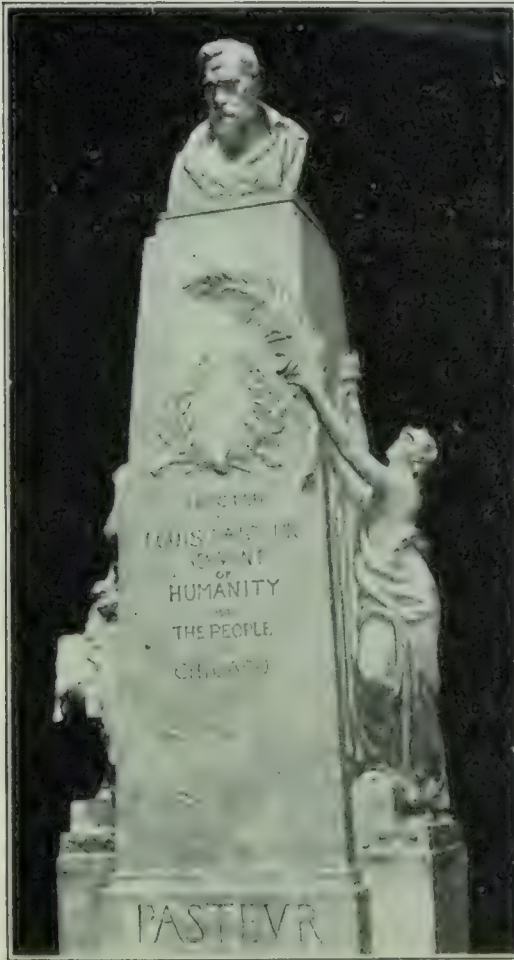
30. Pasteur the master of microbes. After the discovery of microbes there was very little investigation in this field. Microbes were still nothing more than curiosities. The twentieth century was well under way before it was shown that microbes might be useful or be a menace, and that they ought to be controlled. The man who did more than anybody else to lay the foundation of modern bacteriology was Louis Pasteur, one of the most brilliant minds in the history of science.



GERMS FROM A WOUND

The lighter bodies at the swollen ends of the rod-shaped cells are the spores of tetanus germs

Louis Pasteur was born in Dôle, France, in 1822. His father was a tanner, as were also his grandfather and great-grandfather.



LOUIS PASTEUR

A great scientist, a devoted citizen,
everything for others, nothing for him-
self. He saved more lives than Napoleon
lost in his wars

It looked as if Louis would be a tanner, too, but fate had other things in store for him, for he had rare talents and his parents were ambitious for him. He was not a brilliant student in the primary school, but his teachers were much impressed by his vivid imagination. His father used to help him in his lessons. Finally it was decided to send him to school in Paris.

One cold, rainy morning in 1838 he took the coach for the French metropolis. Pasteur loved his studies, but he became dreadfully homesick. "If I could only get a whiff of the tannery yard I should be cured," he said. His father took him home

for a time, but after studying in a neighboring institution for some time he returned to Paris, where he subsequently became a student at the École Normale. He soon won

distinction as a chemist. At the age of twenty-six he became a professor of chemistry at Strasbourg, and later at Lille and at the École Normale.

31. Discovery of the cause of fermentation. There was never a time when people did not know about fermentation; they noticed it in the spoiling of their food and in the making of bread; but previous to the time of Pasteur men knew nothing about the cause. They simply knew that sugar fermented and that crushed grapes and barley sprouts were mysteriously changed into alcohol and carbonic acid. Finally scientists began to study yeast. They found that it was a microscopic plant that put out buds which broke off from the parent plant to form new plants. A German scientist named Schwann found that it was only when yeast was present that sugar and water would ferment. He believed that yeast was the cause of fermentation.

At this point Pasteur began his study of fermentation to help out a manufacturer at Lille. He studied the fermentation of milk and other things as well. He noticed that when milk soured, little gray patches were formed at the bottom and sides of the container. This gray substance contained tiny globules smaller than yeast. This he identified as the ferment of milk,—one of the plants known as bacteria. Further study convinced him that the fermentation of each substance was caused by its own particular ferment.

For some time it had been known that wines could get sick in much the same way as animals and human beings do. They became so sour and disagreeable to the taste that people would not drink them, and the manufacturers lost heavily. Pasteur discovered by means of the microscope that the sick wines contained not merely yeasts but

also other rod-shaped bodies. The latter he at once believed were the cause of the unhealthy fermentation. These foreign ferments, he told the manufacturers, could be destroyed by heating the wines to a certain temperature. This would not destroy the flavor of the wine. Through this discovery Pasteur saved one of the great industries of France. The process of heating a liquid to a temperature just sufficient to kill harmful bacteria finally came to be known as pasteurization. Every large city today pasteurizes its supply of milk and so saves the lives of thousands of children and adults every year.

32. Pasteur and the silk industry of France. When Pasteur discovered that microbes were responsible for diseases of wines, the idea came to him that perhaps microbes were also the cause of diseases among animals and human beings. He soon had a chance to test this idea.

France is a great silk-producing country. During the time of Pasteur the income from silk amounted to millions of francs every year. It was such a great industry that the welfare of thousands of people of southern France depended on the silkworm. The mulberry tree, on which the worms fed, was called the "Tree of Gold." The silkworms made cocoons from which the silk was spun.

For many years a disease had attacked the silkworms. Little spots like grains of pepper on the silkworms indicated the disease from which they sickened and died. Every kind of remedy was tried on the poor worms. Finally the brilliant scientist Pasteur was called to save the industry. For six years he labored. He found that there were really two diseases instead of one, and that they were caused by microbes. Since the disease was hereditary, he suggested that the disease could be prevented if the farmers would choose for breeding purposes eggs from

worms that did not have the disease. This was tried. The disease disappeared, and prosperity smiled again on southern France. Pasteur had won fame and the gratitude of his countrymen.

33. A chance discovery by Pasteur. As Pasteur continued his experiments he discovered, purely by chance, something very important. Chicken cholera was prevalent during his day. It sometimes destroyed as many as eighty or ninety out of every hundred in a flock. Its cause was found to be a little speck which grew very rapidly in chicken broth. A very small drop of this culture would kill a chicken. One day he inoculated some fowls with a little of the culture that had been standing for quite a long time. He found to his surprise that, although they became ill, they subsequently recovered. Later he inoculated them with a fresh culture. He naturally expected them to die, but they were not even ill, although other fowls that had been inoculated with the fresh liquid died. Pasteur found that when the microbes of chicken cholera were exposed to the air, they became weak. When healthy fowls were inoculated with these weakened microbes, they were made immune, — incapable of getting the disease. This was the principle of vaccination, which had already been used against smallpox.

34. Conquest of anthrax. Pasteur now found a new way to serve France. The herds of France were being ruined by a disease called anthrax. Animals that took the disease sickened and died in a few hours. It seemed to linger in particular pastures. The peasants referred to them as "cursed fields." Horses, cows, and even human beings contracted the dangerous illness. Pasteur set to work to weaken the bacteria of anthrax, in order to protect animals against the disease, and finally announced his success.

There were many men who derided this idea of Pasteur's, and one of them, the editor of a veterinary journal, challenged him to a public trial of his anthrax vaccine. Pasteur accepted the challenge. It proved to be one of the most famous events in the history of medicine and hygiene.

The conditions of the test were as follows: An agricultural society was to furnish fifty sheep. Half of them were to be vaccinated with the weakened microbes and later inoculated with the fresh culture; the other half of the flock were to receive the fresh culture only. Pasteur made the prediction that the unvaccinated sheep would die and the others would live.

On May 5, 1881, a great crowd gathered to see the first vaccination. Most of those present thought Pasteur would fail, but he seemed very confident of the result. The second vaccination occurred on May 17. On May 31 the entire flock of fifty sheep were inoculated with the deadly virus. On June 2 a great crowd assembled to see the results. It turned out exactly as Pasteur predicted. One by one the unvaccinated animals fell down dead, while those that had been vaccinated went on chewing their cuds or peacefully eating, all unconscious that they were the subjects of a brilliant experiment.

35. Joseph Meister's life saved. Another dread disease that invited Pasteur's attention was hydrophobia, or rabies. It is caused among human beings by the bite of a mad dog. It was looked upon with horror by the great mass of people, because it usually ended fatally and with great suffering. Taking his cue from the successful experiments with chicken cholera and anthrax, Pasteur, after discovering that hydrophobia attacks the nervous system, found a way of weakening the virus until he could vaccinate animals against the disease. It should be said that

Pasteur was very kind and sympathetic in handling animals, but he believed, as many others believe, that it is best for some animals to die if by this means it is possible to save the lives of many human beings. As we have noticed in the case of anthrax, such experiments on animals have saved the lives of hundreds of thousands of other animals.

Up to this time Pasteur had never treated human beings. He said: "I believe my hand will tremble when it comes to deal with man." But one day a nine-year-old boy was brought to Pasteur's laboratory by his mother. The little fellow on



A SAFE DOG

He cannot transmit rabies because he is inoculated against it. This was made possible through the discoveries of Pasteur

his way to school had been bitten by a mad dog. The boy's mother implored Pasteur to treat the boy. Pasteur was greatly touched by the sufferings of little Joseph Meister, and finally, on the advice of his medical friends, began the injections. They were successful and Joseph lived. Other successful treatments followed. People who had been bitten by mad dogs came to Pasteur from all parts of Europe. Funds were raised for a Pasteur Institute, where further researches might be carried on and treatment given. By 1912 more than thirty thousand treatments had been given. The mastery

of hydrophobia was the last great victory of Pasteur. He died in 1895 at the age of seventy-three.

36. Pasteur's contribution. The name of Pasteur became a household word. He was regarded not only as a great scientist but as a great man. Honors were showered upon him not only at home but in foreign countries. His grateful country voted him a pension of twenty-five thousand francs.

In surveying the great discoveries of Pasteur, Dr. W. W. Keen says:

He discovered the real cause of fermentation and then of putrefaction. He laid the ghost of spontaneous generation. He built the foundations of bacteriology. He proved the germ theory of disease. He saved for his beloved France the several industries of beer, of wine, of vinegar, of silk, of cattle, of poultry, of swine. Better than any one of these, he showed how to abolish childbed fever and hydrophobia among his fellow men.

Pasteur not only proved in a number of cases that microbes were the cause of disease, but also showed how to cure disease, and, better yet, how it might be prevented. Pasteur directed the attention of the scientific men of his time to the menace of microbes. He began that battle against them which is still going on and may continue until disease is entirely conquered. He laid the foundation of modern medicine and hygiene.

37. How microbes invade the body. As scientists accepted the theory and the fact that microbes are the cause of disease, the next question naturally was, How do they get into the body? If their entrance could be prevented, then disease might be prevented.

Research showed that ordinarily diseases cannot get through the skin unless there is some cut or break. Any opening in the skin may be dangerous or even fatal. It is

in this way that the germs of tetanus, or lockjaw, and other infections gain entrance. How necessary it is, then, to keep all skin wounds clean and to apply iodine to kill the germs. As we shall see a little later, the bites of insects open another way for germs to enter.

The other natural openings into the body, especially the nose and mouth, offer routes for infection. Water, food, and air are all means of carrying disease.

38. People as carriers of disease. Some people have an abnormal fear of disease germs, and fancy that these have means of propelling themselves through the air like birds. This is not true. They may be carried several feet from a human being by coughing or sneezing, and so be a menace to the person who breathes the contaminated air, but most of them settle to the floor or ground and soon die. Sunlight is a prompt killer of germs. Most of them die within a few minutes when exposed to bright sunlight.

It should be remembered that most germs are not disease germs, and that even these may live in the body indefinitely without doing any harm. Disease germs cannot live long outside of another body, or host. While man sometimes catches the diseases of animals, nearly all the serious diseases have human beings for their hosts. Sick people are therefore a menace. The dishes that they eat from and the things that they touch may be a means of carrying disease. The person who has a cold and wipes his nose on a saturated handkerchief and then shakes hands with another person may pass on the infection. Doorknobs, since they are touched by so many people, should be washed frequently. The washing of the hands in hot water and soap before eating would probably do much to reduce disease.

39. Meaning of immunity. When one is frequently exposed to a disease under the most favorable conditions and does not contract it, he is said to be immune. It has been proved that some people are naturally immune to a particular disease. In the case of certain diseases immunity is conferred by having the disease. One does not usually have typhoid, mumps, measles, or chicken pox a second time. This is not true of all diseases. Fortunately most diseases confer a lasting immunity. It was this observation in connection with smallpox which led to vaccination against this disease even before the time of Pasteur.

Try This

Write a brief statement about each of the following. Think hard. Do your best.

1. The contribution of Leeuwenhoek to science.
2. The theory of spontaneous generation.
3. The contribution of Spallanzani to science.
4. The way microbes reproduce themselves.
5. Pasteur as a man.
6. Pasteur's contributions to science.
7. How we may become immune.

Interesting Things to Do

1. Explain to the class how a microscope works.
2. Write a play in which Leeuwenhoek or some other scientist mentioned in this chapter is the hero.
3. Report additional facts about the life of Pasteur.
4. Write a composition on how scientists test their conclusions.

CHAPTER IV

OTHER HEALTH HEROES

40. **Jenner, friend of mankind.** One of the first of the great health heroes to teach us about the way to make people immune to disease was Edward Jenner. He made it possible to overcome entirely one of the most loathsome diseases known to man. About one hundred and fifty years ago smallpox was so common that ten out of every hundred deaths were caused by it. During the eighteenth century it is estimated that sixty million people in Europe died from smallpox. In the early part of the eighteenth century it was unusual to meet anybody on the streets of London whose face was not scarred by the disease.

The first account of smallpox in Canada is to be found in the records of the Jesuits. In 1635 it existed among Indians on the St. Lawrence. There were three thousand deaths from the disease in Quebec in 1702. Increasing trade spread it over the country, and in 1749 there were more than a thousand cases in Halifax alone.

In the eighteenth century a method of lessening the virulence of smallpox came in from the Orient. Smallpox was so common there that the Orientals had decided that if they must have the disease, they would have it when it suited their convenience. A tiny bit of matter from a pustule of one suffering from the disease was inserted under the skin of a healthy person. This inoculation resulted in the actual disease, but it was usually in a milder form and there were fewer fatalities. This method was

finally introduced into England by Lady Mary Wortley Montagu, the wife of the British ambassador at the Ottoman court. Inoculation against smallpox continued until it was finally prohibited by Parliament in 1840. Although inoculation was fairly successful, those inoculated really had the disease, and sometimes it took on a virulent form



EDWARD JENNER

He made possible the conquest of
smallpox

and started an epidemic. At a time when this dissatisfaction was evident a new protection against smallpox was found.

Edward Jenner was a wide-awake physician in Gloucestershire, England. As was the custom, he inoculated many persons for smallpox. It happened that Gloucestershire was a dairy country and that from time to time there appeared among the cows a disease known as cowpox, marked by the appearance of pustules on

the udders. Often milkers with slight abrasions of the skin contracted this disease. Pustules developed on their fingers and hands. It was quite generally known among doctors at the time that those who had had cowpox failed to have smallpox when they were inoculated. Jenner was not the first to observe this, but he was the first to investigate scientifically the relation between these two diseases. On May 14, 1796 — a great day in the history of medicine — he

took some matter from a cowpox sore on the hand of a dairymaid and with it he inoculated James Phipps, a healthy boy about eight years of age. A single pustule formed, which rapidly formed a scab and dried up, leaving only a scar. Six weeks later, and again several months later, the boy was inoculated with smallpox from matter taken from a smallpox patient. No sign of smallpox followed. This method of protection against smallpox was called vaccination (from the Latin *vacca*, "cow").

Vaccination was soon practised all over the civilized world. Napoleon, quick to see its

advantage in keeping his armies in fighting condition, ordered that all his soldiers who had not had smallpox should be vaccinated. Prominent people everywhere had themselves vaccinated and also recommended it to others. Spain sent ships to all her dominions carrying physicians and vaccine.

Today the greatest care is exercised in the preparation of vaccines. It is never taken from a smallpox patient, but from a perfectly healthy calf. Every precaution known to medicine is taken to insure cleanliness and the quantity and quality of the vaccine.

Vaccination was such a success that in 1802 Parliament voted Jenner ten thousand pounds. In 1806 he received twenty thousand pounds as a token of a nation's gratitude. Although at times he was bitterly attacked, honors continued to be paid to him even after his death. Only recently a small fishing town in Japan, ravaged by smallpox which was finally brought under control by vaccination, erected a monument to him.

People in Vancouver neglected vaccination
after 26 years of no deaths from smallpox.
1932 saw 17 deaths in one month:

**Sixteen were never vaccinated.
One was vaccinated 35 years ago.**

*Don't wait for a smallpox epidemic.
Get vaccinated every 7 years.*

Nothing in medical science is more certain than the fact that vaccination prevents smallpox. In those countries where vaccination is common, smallpox has almost entirely disappeared. The community that neglects vaccination is a fertile field for the disease. For safety, people should be vaccinated about every six years. In every epidemic of smallpox those that have been successfully vaccinated against the disease escape. Vaccination was introduced into Canada in the spring of 1802 by Dr. Joseph Bond of Yarmouth, N. S., who had received some vaccine from his brother, a friend of Jenner.

41. Immunity explained. The fact that persons might be immune to particular diseases was known and made use of before it could be explained scientifically. The work of Pasteur and the distinguished investigators who followed him have now told us much about the way in which the body protects itself.

Disease germs that find entrance into the body eventually find their way into the blood stream. Here they may be attacked by the white corpuscles. Under the microscope these little bodies look very much like the microscopic amebas frequently found in stagnant water. They change their shape readily, and easily make their way through the tissues. They seem to have a keen appetite for germs that are harmful to the body. One of the most brilliant observations with the microscope was the discovery that these white corpuscles eat disease germs. The pus, or matter, which sometimes collects when we run a sliver into our finger is made up largely of dead white corpuscles. They have lost their lives while defending the body against the foreign enemy which has entered through the break in the skin. As the body overcomes a germ disease the number of corpuscles steadily increases.

The second method of attacking the invading microbes is through the antibodies. These are substances which cannot be seen under the microscope or identified by chemical tests. They are in the liquid part of the blood and aid powerfully in overcoming disease. They may kill or dissolve the bacteria or help the white corpuscles to destroy them. There are several different kinds of antibodies. The class of antibodies most commonly heard of are the antitoxins. They neutralize the poisons (toxins) which the bacteria manufacture.

In the light of such knowledge we understand better how disease is overcome and how immunity against it is established. An illness of bacterial origin will continue until so many antibodies have been produced that, with the white corpuscles, they can overcome the disease. The antibodies are usually produced in excess quantities and may be found in the body for a long time after the illness. As long as such a condition persists there is immunity. One is said to be naturally immune if his body already contains enough of the immune substances. In many cases it is probable that the person had the disease in such a light form that it was not detected, and yet immunity was established.

42. Artificial immunity. One way of overcoming disease or preventing it is to stimulate the blood to produce antibodies by inoculation with live germs. This was the method employed by Pasteur in his work against anthrax and hydrophobia. This was also the method employed against smallpox by Jenner. Cowpox is doubtless a modified form of smallpox. It leads the blood to produce antibodies and so establishes immunity.

Weakened but living germs may be used to produce immunity, or dead germs with their toxins may be used,

as in the case of typhoid fever. The toxin of typhoid stimulates the blood to produce antibodies. Typhoid fever has always been the curse of armies. During the South African War, before typhoid vaccine had been discovered, more men were lost through typhoid than fell

in battle. During the World War, when our soldiers were made immune against it, typhoid was almost unknown.

Another way to combat disease is to inject into the body antitoxin produced by animals. This method was used successfully with diphtheria.

The value of diphtheria antitoxin was recently brought to the attention of the public by a threatened epidemic at Nome, Alaska.

The nearest help was



BALTO

Hero of the thrilling Alaska death race

nearly a thousand miles away in the town of Anchorage, where there was a supply of diphtheria antitoxin. Nome had no antitoxin. The physician at Anchorage dispatched a supply by Gunnar Kassen with his team of dogs. Ordinarily it took fourteen or fifteen days to make the trip. The relief of Nome was one of the spectacular events in the history of medicine. Day after day people at their breakfast tables eagerly read the morning paper to find out whether Kassen and his dogs had arrived. The ther-

mometer fell to 50 degrees F. below zero, but the dogs, trained to exposure and cold, sped on. For speed every known sledge-dog record was broken. The regular fourteen-day trip was cut to five. Nome was saved!

A poem was written by Alice Rogers Hager on Balto, the leader of the swiftest dog team, which began thus:

Men and dogs on the Arctic trail,
Fighting the blizzard home,
Blind and dumb in the roaring ice,
Breaking the road to Nome:

For sick lips cried that they might be spared,
And white men dared to go,
Out through the din and the thundering night,
Out through the wind-whipped snow.

Continuing the story the poet closes with

Men have circled the circling earth,
Laughing at air and foam —
But tell of a greater tale than this:
Balto, who went to Nome.

Many who read this dramatic story thought not merely of the dogs and their driver but also of the patient experimenters in the laboratories, working at first hand with dangerous microbes, who had made such heroism worth while.

43. The conquerors of diphtheria. The conquest of diphtheria has been a subject of interest to many of the most brilliant research workers during the last hundred years. In 1821 Bretonneau of Paris gave an accurate description of its symptoms, so that it became possible for doctors to recognize it; the second victory was the discovery of the germ by Klebs and Loeffler in 1883 (up to this time people thought diphtheria was caused by inhaling sewer gas!); in 1890 Von Behring, a pupil of Koch,

and Roux, a pupil of Pasteur, found that the poison caused by the germ could be neutralized by antitoxin. This victory was great indeed, for it was now possible to fight the germ even after the disease had developed.

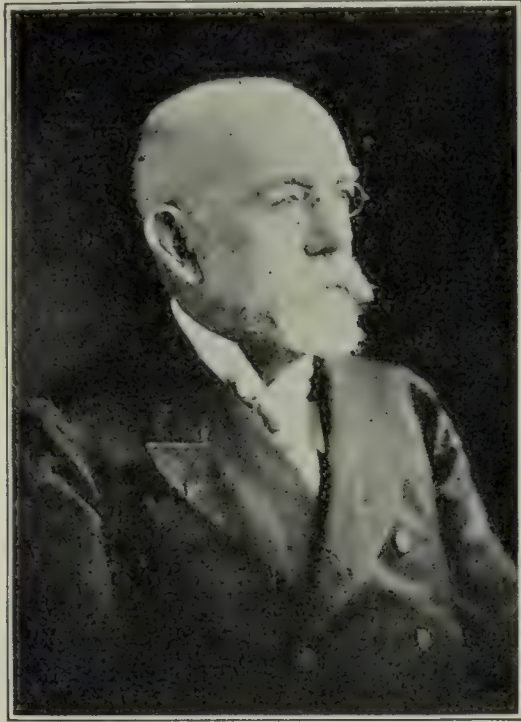
Unfortunately, however, children did continue to die from this disease; antitoxin was not always available or was given too late. The crowning victory in the conquest came when science produced not a cure but a *preventive*. Ramon, of the Pasteur Institute in Paris, has perfected this product, which in Canada is known as toxoid. It is given in three small doses, three weeks apart. Experience over twelve years has shown that it is truly a preventive, and every city and province in Canada has reason to be gratified with the results shown in the saving of lives and the reduction of suffering from this one-time dreaded disease of childhood. Toxoid is supplied free in most provinces of Canada by the provincial departments of health, so that all Canadian children may be protected against diphtheria.

44. The battle against tuberculosis: Koch and Trudeau. While Pasteur was absorbed in his many experiments, an unknown country physician was practising medicine among the villages of Prussia. His name was Robert Koch. He found this practice uninteresting because so little was known about the causes of disease.

When he was twenty-eight his wife presented him with a microscope, probably in the hope that he might find its manipulation recreative. He began at first, like Leeuwenhoek, to look at everything around him in a hit-and-miss fashion, but soon he became fascinated by the study of microbes. The hunt became so absorbingly interesting that he became very absent-minded, forgot his wife, and even forgot to call on his patients. It would

be too long a story to tell about all the wonderful things he did, but he gained his greatest fame as the discoverer of the bacillus of tuberculosis. After he made the discovery he did not rush at once into print, but verified it again and again by many careful tests. People of all lands were thrilled by the news that this assassin had been discovered. The obscure country doctor with his crude home-made laboratory had beaten out the greatest scientists. The scientific world bowed down to him. He aroused a hope that an effective anti-toxin might be prepared to combat tuberculosis, but this hope has not yet been realized. Other heroes, inspired by his zeal, have fought the disease with marked success.

Among the many men who were thrilled by the great discovery of Koch was Dr. Edward Livingston Trudeau in distant America. His life was an inspiration to the whole world. Trudeau was born in 1848. Both his father and his grandfather were physicians. Like many young men, he was anxious to succeed. Just as he was about to enter college his brother developed tuberculosis. Trudeau was very fond of his brother and returned to his



ROBERT KOCH

A distinguished German scientist. He discovered the bacillus of tuberculosis

grandfather's house to nurse him. At that time nobody thought that tuberculosis could be cured. Trudeau occupied the same room with his brother and tried to cheer him through his long days of fever and illness. The physician in charge never cautioned him against catching the disease. The physician "told me repeatedly," said Trudeau, "never to open the windows, as it would aggravate the cough; and I never did until toward the end my brother was so short of breath that he asked for air." How strange this story seems in the light of Trudeau's discoveries!

After his brother's death Trudeau studied medicine, married, and began to practise his profession. It was then discovered that he had tuberculosis in his left lung.

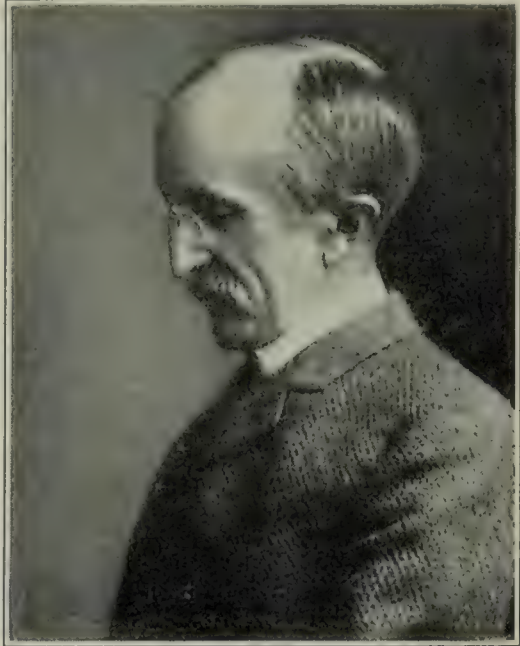
How dark the world seemed! And my rose-colored dreams of achievement and professional success . . .! They were all shattered now, and in their place only exile and the inevitable end remained.

The memories of the many happy days that he had spent in the woods and mountains came back to him, and he set out for the mountains and lived for some time at a hunting lodge. The rest, good food, sleep, and fresh air after a time made him feel better. His fever left him, his appetite became keen, and he gained rapidly in weight. Later he found a house at Saranac Lake, where he lived the remainder of his life. Dr. Loomis, who examined Dr. Trudeau, found him much improved and began to send to him other tuberculosis invalids. As he recovered Trudeau began to practise his profession and take a keen interest in life. He was so kind and sympathetic with the people of the region that he became known as the "beloved physician."

Finally the idea came to him of building a sanatorium for tuberculosis patients at Saranac Lake. He then called upon people who, he thought, might give to such an enterprise. He found it hard work, because people argued that tuberculosis was incurable. Finally he was able to build the sanatorium, which became famous throughout the country and served as a model for hundreds of other sanatoriums.

He was in the midst of building his sanatorium when he learned of Koch's discovery of the tubercle bacillus. He hastened to learn how to find and study the bacillus. Next he fitted out for himself a laboratory at Saranac Lake, where he worked for many years, hoping to find a way to kill the bacillus in man. He did not find what he was looking for, but he did make a famous experiment with rabbits which every boy and girl ought to know about.

Trudeau experimented on three groups of five rabbits each. Lot 1 was inoculated with a pure culture of tuberculosis and put in a very favorable environment with reference to food, light, and air. Lot 2 was inoculated in a similar way but put into the worst conditions that



EDWARD LIVINGSTON TRUDEAU

The beloved physician. He proved that tuberculosis could be cured. His autobiography is a wonderful literary production

Dr. Trudeau could devise. Lot 3 was not inoculated, but was also put in a very bad environment. The five rabbits of Lot 1 were allowed to run wild during the summer in the sunshine and air. All but one recovered. Of Lot 2 only one survived at the end of three months and the microscope showed extensive tuberculosis. Those of Lot 3, though very thin, showed no signs of tuberculosis.

This experiment showed that a bad environment alone would not produce the disease unless germs were present. It also showed that after the disease had begun, a favorable environment as to food, sun, and air did much to counteract the disease. This experiment did much to encourage Trudeau to go on with the sanatorium treatment. By such simple methods of treatment thousands of lives have been saved. Trudeau proved that the disease can be arrested if not cured.

The death rate from tuberculosis is rapidly declining, and sometime we may hope to find it a rare disease.

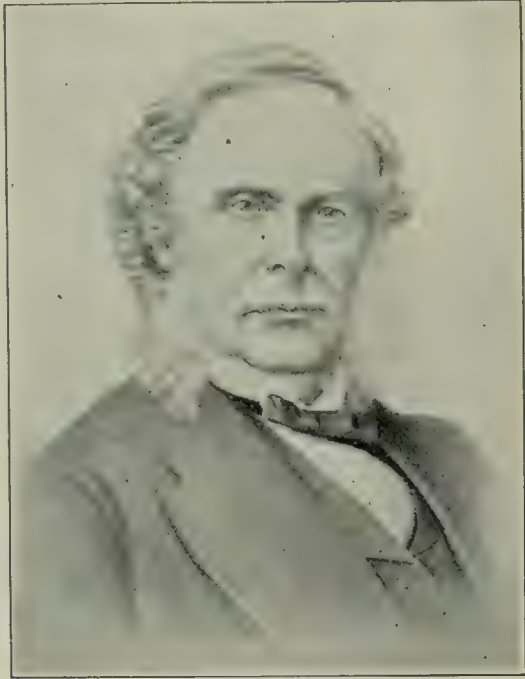
45. Lister, founder of modern surgery. In the history of surgery the name of Lister leads all others, because he applied the discoveries of Pasteur to this science and brought about a revolution in surgical practice. Lister was recognized as one of the prominent surgeons of Scotland. At that time hospitals were in a horrible condition. The use of ether and chloroform had now become common, thus banishing many of the discomforts and dangers of surgery, but after operations there was a dreadful loss of life due to frightful infections. Every wound discharged pus freely. This was thought to be a natural and necessary stage in the healing of a wound.

In the light of present-day surgery the hospitals of that day seem indescribably filthy. Surgeons took no special pains to keep their instruments clean. Often

they wore the same coat in performing operations day after day. No special care was given to keeping the wounds clean. Little wonder, then, that most hospital surgeons at that time were content to lose from one third to one half of their amputation cases. Many able surgeons at that time seemed to think that to get rid of the hospital diseases it was necessary to demolish the hospitals.

At this time Lister became interested in Pasteur's experiments on fermentation and putrefaction. He became convinced that decomposition was due to minute organisms, and that this might be avoided by applying some kind of dressing to destroy these organisms. He began to experiment with carbolic acid and, after some fail-

ures, was successful. His ward in the Glasgow Royal Infirmary now became the healthiest one in the world. Lister spent much of his life in converting the rest of the world to his methods. He made hospitals safe places instead of centres of infection. As a result of his use of antiseptics in surgical work, mortality rapidly decreased, and many operations were performed safely that before were pronounced absolutely fatal,



JOSEPH LISTER

The prince of surgeons. His brilliant achievements made the world his debtor

46. Roentgen; he gave the world new eyes. The telescope enables us to see distant worlds in space; the microscope, to see the most minute worlds, invisible to the unaided eye; but the X-rays give us the ability to see through things that are solid, such as flesh and bones. The man who made this possible was William Konrad Roentgen, a German university professor.

One day, while experimenting in his laboratory with what is known as a Crookes tube, he found that a piece of coated paper glowed although it was not directly in front of the tube. He found that it still continued to glow even after he put a piece of black paper in front of it. To his great surprise, he found that when he held up his hand in front of the paper he saw what no man had ever seen before, — the shadows of the bones of his hand. They were new eyes, the X-rays.

Today these new eyes are used to locate all sorts of things — foreign bodies, such as bullets and needles, in the flesh; abscessed teeth; and diseased conditions of the internal organs. The world has reason to remember with gratitude the gift from Roentgen of new eyes.

47. Pierre and Madam Curie, discoverers of radium. In 1908 Madam Curie, assisted by her husband, a university professor, astonished the world by discovering a substance which is many thousand times more valuable than gold. For a long time they had been on the track of a new metal. In their experiments they moved out into an abandoned shed in the outskirts of Paris. There they worked unceasingly, boiling and stirring, in a large cast-iron vessel, tons of what looked like waste material. Sometimes the man wrote queer things on a blackboard while his wife "brewed tea." They often remained in the evening to watch the fairy light which glowed from the big pot.

Then the discovery of radium was announced, a substance which threw off great quantities of energy in the form of heat, light, and electricity without apparently losing any part of itself. Radium not only brought about a revolution in science, but it was finally found to be very helpful in the cure of cancer.

Recently large quantities of pitchblende, from which radium is extracted, have been found in Canada.

48. Conquest of malaria. It was through the brilliant work of an English investigator, Ronald Ross of the Indian Medical Service, that the mosquito was found guilty of carrying malaria.

Malaria had always been one of the pests of mankind. It was invariably found in damp, swampy places. It was thought by many that the disease was due to a marsh vapor. In 1880 a French army surgeon discovered the microbe that caused malaria in the blood of malarial patients. Even after this discovery it was a mystery as to how the disease could be communicated from the sick to those who were well. It took twenty years to prove that a mosquito was the real offender.

In 1900 an experiment was carried on in the Roman Campagna,—a region notorious for its malaria. A number of volunteers lived in this region in houses that were carefully screened against mosquitoes. When they went out in the evening they were particular to wear veils and gloves. They lived in this way from July until October (the most dangerous part of the year) without contracting malaria, although many of their neighbors who did not take the same precautions had the disease. It was discovered that there were places in Italy where there were many mosquitoes but no malaria. It was also discovered that in those places where there was malaria there

were always mosquitoes. Careful study by Ross and others showed that a particular kind of mosquito, the *Anopheles*, was responsible for the disease.

At the same time that the above experiment was being carried on, another dramatic incident in science was being staged. Some mosquitoes were caught and allowed to bite malarial patients. They were then shipped to England. Here two young men who had never had the disease and lived in a region where it did not exist allowed themselves to be stung by these mosquitoes. In a few days both of them came down with malaria. Such experiments showed that the *Anopheles* mosquitoes and not marsh air were responsible for the disease. The most common mosquitoes are the *Culex*, which are troublesome but harmless.

Today malaria has disappeared from those sections where people protect themselves against mosquitoes. This may be accomplished by preventing them from breeding,—by draining swamps, filling in low-lying spots, screening tanks and cisterns, and oiling puddles which cannot be readily drained. The oil forms a film over the water, which prevents the larvæ of the mosquitoes from breathing. Houses need to be carefully screened. At one of the towns on the Suez Canal where Ronald Ross took charge of the war on the *Anopheles*, the number of cases of malaria was reduced from 1551 in 1902 to 37 (all of which were cases of relapse) in 1905.

49. Walter Reed. The story of Walter Reed, an American army surgeon, and his companions is one of the brightest pages in the history of the conquest of disease.

In 1900 yellow fever broke out among the American troops in Cuba. Reed was made chairman of an army board to find the cause of the disease. The American army was almost useless at this time because of the ravages

of this disease. Gorgas, who was in control of sanitation at Havana, had cleaned up the city and made it one of the cleanest in the world. In spite of this the disease was even more prevalent than it had been for several years.

Reed suspected the mosquito. Experiments were made. Men volunteered to allow themselves to be bitten by mosquitoes that had previously bitten yellow-fever patients. During this experiment some of these men died and others were disabled. As a result of these heroic sacrifices it was proved conclusively that the disease could be spread only by a particular kind of mosquito called the *Stegomyia*. War was then declared against the mosquito. As a result Cuba became a safer place in which to live. A similar warfare against the mosquito enabled the Americans to build the Panama Canal.



WALTER REED

Leader of the group who proved that a mosquito carries yellow fever. (By courtesy of The Century Co.)

50. Warfare against other insects. Typhus fever is known as one of the great epidemic diseases. It is always worst in conditions of filth and overcrowding. This was easily explained later, when it was discovered that body lice spread the disease. The control of the disease was found to be quite simple after the cause was known. It is

necessary to avoid being bitten by the louse. Since the louse attaches itself almost entirely to the underwear, and since both it and the eggs may be killed by boiling water, cleanliness is essential. One should also avoid rooming places that are likely to be infested with lice.



CARLOS FINLAY OF HAVANA

Who first suggested the theory that the mosquito transmitted yellow fever.

(By courtesy of The Century Co.)

During the World War typhus and trench fever (also spread by body lice) were prevented by frequently delousing the soldiers.

The common house fly is often called the typhoid fly, although it may be responsible for the spread of other infections. The fly seems peculiarly adapted to spread disease. First of all, the eggs of flies are deposited in filth, and in this they begin their lives. Then they have most disgusting habits of crawling over garbage

and filth. Since the feet of flies are hairy, the flies are well fitted to carry this. Thus they can easily contaminate food.

The way to combat the fly is to prevent its breeding. Since flies frequently breed in manure, this should be screened or disinfected with borax or chloride of lime, and as the flies breed very fast, it is desirable to kill the early ones. Something can be done toward this by swatting and by using poison. Food should be protected by screens.

The careful screening of houses effectively protects many homes from flies today. One should avoid restaurants and other public eating places where flies are common.

After the work of men like Walter Reed, all insects were suspected of having something to do with the carrying of disease.

The bubonic plague, known in history as the Black Death, which has been so destructive of life, was proved to be a disease among rats. It was discovered that the plague was transferred among the rats by fleas that bit sick rats and sucked their blood, and later bit other rats. If fleas left diseased rats and bit human beings, they too developed the plague. The way to deal with this danger is to destroy rats and



HIDEYO NOGUCHI

Famous Japanese scientist who died on the west coast of Africa in an attempt to identify the germ of yellow fever —
a heroic martyr in a great cause

fleas. Many health departments today employ professional rat catchers to destroy rats. When a ship comes from an infected port, it is thoroughly fumigated to kill rats and fleas, and special devices are used on anchors and chains to prevent the rats from getting to shore.

Every householder should have buildings with foundations of stone, brick, or cement. Rats will not trouble people if care is taken to protect all food and garbage.

51. Florence Nightingale. In the battle for health there is no more inspiring life than that of Florence Nightingale. As a girl she had everything to make her happy. Yet she was not satisfied. She wanted to be a nurse, but that was the one desire that her parents did not wish to gratify. Gentlewomen in those days did not become nurses.



A RAT FLEA, HIGHLY
MAGNIFIED

It may carry plague.
Prevention of this dis-
ease demands the de-
struction of rats

Nevertheless, Florence Nightingale was determined to become a nurse and to reform the conditions in the hospitals.

In 1854 England and France found themselves at war with Russia in the Crimea. There was awful suffering among the sick and wounded. Florence Nightingale offered her services to the British government. There were no sanitary facilities, no laundry, no supplies, no food fit for the sick. In the end she overcame every obstacle. Because she passed through the wards of the hospital at night smoothing the pillows of the sick and smiling to the wounded, she was called the Lady of the Lamp. The death rate in the hospitals dropped from 50 and 60 per cent to 2 per cent. She laid the foundation of modern nursing. In 1907 King Edward conferred upon her the Order of Merit, given only to those who render great service to the Empire. She was the first woman to receive this award.

52. Sir William Osler. At the early age of twenty-five, Osler was made professor of medicine at his Alma Mater, McGill University. He had been born in Ontario and was a student in arts at the University of Toronto before going to Montreal. Of his professional life he spent nine years

in Montreal, five in Philadelphia, then fifteen years at Johns Hopkins University, and the last fifteen years of his life (1905-1919) as Regius Professor of Medicine at the University of Oxford. In each of these centres he made himself felt as the advocate of measures to improve the public health. He was particularly interested in tuberculosis and organized the first society of medical and lay people in America to help in the campaign against this disease.

For the part he played in bringing about a new era in health, in reorganized medical schools, and in remodeled hospitals, and for his tremendous work for humanity in general, he was knighted by the King. He worked very hard all through the World War, and died at Oxford in 1919, mourned as one of the greatest physicians and teachers in the history of medicine.

53. F. G. Banting. Among those leaders who have stood out in the front ranks of health heroes is Dr. F. G. Banting, who, through his discovery of insulin, has saved the lives of many people suffering from diabetes. Those afflicted had large amounts of sugar in their blood. For some unknown reason the body was unable to make use of this sugar. Diabetic patients were thin and listless. The disease was found to be often fatal to children.

Relief from this disease was at last found through the discoveries of Dr. Banting and his associates, Dr. C. H. Best and Professor J. J. R. MacLeod at the University of Toronto. For some time it had been known that diabetes was due to the failure of the pancreas to turn into the blood a certain secretion. These Canadian scientists discovered that when an extract made of those parts of an animal which manufactured this secretion was given to diabetic patients they speedily improved in health. This

new extract was called insulin. This discovery gave hope to countless thousands of people all over the world.

54. What the health knights contributed. Let us now try to enumerate some of the achievements of the health knights in their battle against disease.

1. In ancient times the cause of disease was unknown. It was thought to be due to evil demons, peculiar movements of heavenly bodies, or other unreasonable causes.
2. Even in ancient times men discovered through experience certain things about health and disease.
3. The discovery of the cause of communicable diseases had to wait until the microscope was discovered.
4. Leeuwenhoek developed the microscope and discovered the first germs, or microbes.
5. Pasteur laid the foundation for a new science, bacteriology. He discovered that bacteria threatened the silk and stock-raising industries in France, and found a way to save these industries. He showed how hydrophobia might be prevented. He proved that microbes were the cause of communicable diseases.
6. Through the researches of Pasteur and others we have discovered that germs make a poison, called toxin, and that our blood protects us by producing antibodies, particularly antitoxin. Some diseases, like diphtheria, may be prevented by injecting into the circulation of persons diphtheria antitoxin which has been manufactured in the blood of animals. The injection of dead germs, as in the case of typhoid, will stimulate the blood to produce antitoxin.
7. To prevent disease it is well to avoid people who are ill and to prevent the entrance of germs into the body.
8. The discovery of vaccination by Edward Jenner made the prevention of smallpox possible.
9. Koch discovered the germ of tuberculosis, and Trudeau showed that the disease might be prevented or arrested by good health habits.

10. Lister made use of some of the truths discovered by Pasteur and revolutionized conditions in hospitals.
11. Sir William Osler was a famous Canadian physician who was knighted by the King for his service to humanity.
12. Through the discoveries of men like Sir Ronald Ross and Walter Reed malaria and yellow fever have almost entirely disappeared.

Try This

Write a brief statement about each of the following.

1. The contribution of Edward Jenner to science.
2. The discoverer of the bacillus of tuberculosis.
3. How Trudeau recovered from tuberculosis.
4. The founder of modern surgery.
5. Antiseptic practices in surgery today.
6. The fight against malaria and typhoid.
7. The fight against the fly and the rat.
8. How the individual may protect himself against disease.
9. What my community is doing for the health of its people.

Interesting Things to Do

1. Appoint a committee to report to the class on the ways in which your community is protected against disease.

2. Draw a large map of your city or township. Report on breeding places of flies, mosquitoes, and rats. Make a different-colored spot on the map for each kind of danger, such as uncovered garbage pails, unscreened outdoor toilets, manure heaps, standing water, and dump heaps.

3. Ask the city (or county) health officer to show you records of communicable diseases of the past year. Make another spot map, with a different color for each disease.

4. Appoint two pupils to visit each place in town where food is sold and report on the cleanness and on the protection of foods from dust, from animals, and from handling.

CHAPTER V

THE CAUSE, PREVENTION, AND CURE OF COLDS

55. The menace of colds. A common expression is, "It's only a cold"; but colds are not to be treated so lightly. They are one of the pests of humanity. More people suffer from colds than from any other single ailment. Nearly everybody, in the course of a year, has one or more colds. The vast majority of colds do not prove to be serious, yet any cold leads to discomfort and may lead to financial loss and severe physical suffering. Business concerns find that colds among their employees are often a serious handicap to success. As a single cause of absences colds usually head the list in both business and schools. The so-called common cold, if it is not cared for, may pave the way for such serious maladies as pneumonia, pleurisy, and other infections. In spite of the frequency of colds, and their seriousness, medical science has made less headway against them than it has against typhoid and many other diseases.

56. Colds caused by bacteria. Common colds are caused primarily by bacteria. Instead of one kind of germ that is responsible, there are so many that medical science so far has not succeeded in identifying and cataloguing them. Most colds start high up in the throat and then spread into the nasal cavity. A cold may spread to the throat and lungs. The symptoms of a cold are so common that they require no description. The most common symptoms are dryness of the throat, burning of the eyes, a nasal dis-

charge, and a feeling akin to fatigue. A severe attack is usually accompanied by chills and fever. It should be remembered that colds are communicable.

Various names are given to colds, according to the location of the infection. A cold in the head is called rhinitis; an infection which covers substantially all the throat is pharyngitis; if confined to the tonsils, it is known as tonsillitis; when it attacks the tubes of the lungs, it is



WILL YOU LEND A HAND?

called bronchitis, and when it reaches the cells of the lungs it is pneumonia.

The ordinary cold is not so serious in itself, but it may lead to complications of a very serious nature. Colds are now considered one of the predisposing causes of heart trouble and rheumatism.

57. **How to treat a cold.** The time to begin to treat a cold is as soon as one feels it approach. The following suggestions represent the general consensus of reliable opinion as to the best methods of dealing with colds:

1. *Get more rest and sleep.* This is quite essential, so that the body may be in a good condition to fight the cold. In such a case it is a wise plan to cancel engagements so far as possible and retire early. This should be accompanied by a diminution of work. Unfortunately in many cases people get the idea that to adopt such a

method would mean "babying one's self," which would be disgraceful and unnecessary. As a result the cold may get worse and hang on for a long period of time, often forcing the person to abandon his work and take to his bed.

2. *Rid the body of poisons as speedily as possible.* Catching a cold means that the bacteria which have invaded the body are manufacturing poison which, if allowed to remain in the system, may do serious damage. The body gets rid of its poisons, or excretes, through four different channels — the lungs, bowels, kidneys, and skin. All these channels should be kept open. Ordinary breathing eliminates some of the poison. The bowels should always be kept open. Ordinarily a mild cathartic is necessary. Drinking generous amounts of water is to be recommended, since this enables the kidneys to throw off poison readily.

One of the most popular treatments is to make the patient sweat. It is to be recommended. The old-fashioned remedies that have proved effective are to take a hot bath or a foot bath, which should continue for from ten to twenty minutes, before the patient retires. He should then take a hot drink, such as hot lemonade, and go to bed with extra covering over him. The heating of the body tends to relieve the congestion of blood, restore the circulation to a normal condition, and get rid of poison. This is so effective that sometimes the person who retires at night with all the symptoms of a cold rises the next morning feeling perfectly well. The sweat treatment is to be undertaken only after the liberal drinking of liquids; otherwise the treatment would do more harm than good. Ordinarily the hot bath is effective only during the first stages of a cold. It is to be avoided when there is a temperature.

3. *Eat lightly.* This relieves the strain on the digestive system. In mild colds the matter of diet is not so important. In severe colds accompanied by fever the diet

should be largely liquids and soft, easily digested food. The food should be simple and nutritious.

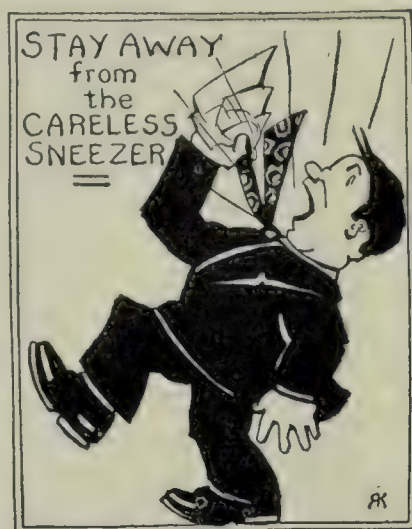
4. *If feverish, call your family physician.* This is always wise, since he may prevent serious complications.

58. Prevention of colds. Although the problem of preventing colds is far from being solved as yet, the following suggestions, if carried out, would without doubt greatly lessen the number of colds.

1. *Avoid people who have colds.*

If we could prevent the entrance of cold germs into the body, there would be no colds. As is well known, they are so contagious that frequently they run through an entire family, school, or office. Colds are most contagious at the beginning. At that time especially, the person with a cold is a menace. Avoid him as much as possible. Coughing and sneezing are ways in which the bacteria are sprayed around. When people become more enlightened as to colds, those suffering from that malady will be promptly isolated, as they are in most contagious diseases. This plan has been adopted in some schools to advantage. The pupil who has running eyes and nose and is coughing and sneezing has no business to be in school infecting others. He should go home and go to bed.

2. *Form habits to avoid contact infection.* Colds, like many other diseases, may be transferred by direct and indirect contact. Habits that should be avoided are kissing, drinking from a common drinking cup, using a roller



HE DESERVES A JAIL
SENTENCE!

towel, and putting fingers, toys, pencils, and other things into the mouth. Washing the hands before eating is especially important. How easy it is to get the hands contaminated. You meet a friend suffering from a cold. Previous to your meeting he has used a moist handkerchief freely. You shake hands. Along with the cordiality of the handshake he passes on the contamination from his hands to yours. Later you touch food or a pencil which is carried to the mouth, and so get your friend's cold.

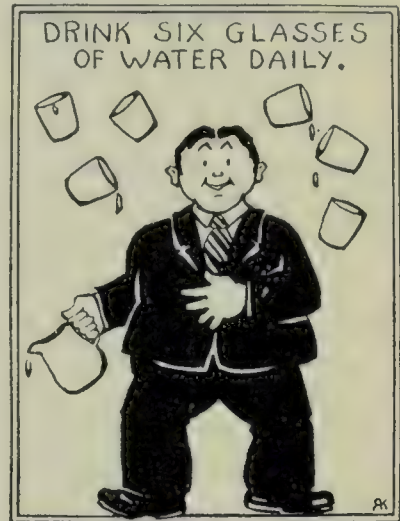
3. *Avoid being chilled.* Drafts in themselves do not cause colds, but drafts that suddenly cool the body, and exposure to cold that chills, do tend to make one susceptible to colds. Needless exposure to cold is always to be avoided. Colds due to exposure may sometimes be prevented by hot baths, hot drinks, and going to bed early.
4. *Avoid overheated living rooms.* Probably one of the most common causes of colds is the overheating of our homes, business offices, and schoolrooms. Hot, dry air in overheated rooms dries the mucus of the nose and throat, produces irritation, and makes infection easier. The temperature in homes and schools should be about 68 degrees Fahrenheit. It should never exceed 70 degrees.
5. *Adapt your dress to the weather.* Since the temperature in our homes and schoolrooms is likely to be summer heat, the wearing of heavy clothing indoors is not to be recommended. Such bad habits produce discomfort and make the skin sensitive to cold. One should adapt one's self to the outdoor weather by suitable wraps. On cold days one should be adequately clothed with heavy outer garments. Probably inadequate dress when exposed to the cold of street cars and streets is responsible for many colds.
6. *Get plenty of fresh air.* Colds are caught indoors, where people congregate, rather than out of doors. It is not

the engineer in the cab, with his head protruding, looking up and down the track, who has colds. They are reserved for the passengers in the stuffy coaches. Indoor air is likely to be dry, dusty, and contaminated with germs of cold; outdoor air is usually moist and fairly free from dust and bacteria. As soon as windows are opened in the spring, colds begin to disappear; when the windows are closed in the fall, the colds promptly make their appearance. To avoid colds one should spend much time each day in the open air and sleep with one's windows open.

7. *Train your skin to resist changes in temperature by cold baths and vigorous rubbing.* Some people are more susceptible to colds than others, since the circulation of blood in their skin is too sluggish. Their nervous system and mus-

cles act in such a way that the blood leaves the skin too rapidly and returns slowly. This sluggishness can be overcome in part by taking cold baths and giving one's self a vigorous rubbing afterward. The cold plunge bath is to be avoided by most people. The best kind of bath is the cold sponge bath early in the morning. A good way to get used to the shock of the cold sponge bath is to begin in summer. People who are frail or in ill health should not take cold baths without the advice of the physician. In such cases a cold bath tends to reduce the resistance to colds by using up too much energy.

8. *Avoid constipation.* Since constipation involves the collection of poisons in the system, it is a menace to health



HEALTH HABITS HELP TO
PREVENT AND CURE COLDS

and, in the opinion of the best medical authorities, makes one more susceptible to colds. This should be corrected by drinking plenty of water and eating fruits, vegetables, brans, etc. If one has persistent trouble, he should consult a physician.

9. *Choose a normal diet.* Children of junior-high-school age frequently do not eat enough. There should be an abundance of nourishing food and a well-balanced diet. Foods such as egg yolk and butter are especially desirable.
10. *Avoid undue fatigue.* There is a good deal of evidence to show that fatigue makes the invasion of cold germs easier. Dr. Russell L. Cecil says that he knows "people who never get cold except when they are in a state of physical exhaustion." When this condition is accompanied by overwork, worry, late hours, and lack of recreation, colds naturally result.
11. *Keep yourself in first-class physical condition.* To avoid colds one should keep himself in good physical condition. Sleep, fresh air, exercise, wholesome recreation, nutritious food, and attention to the other suggestions for personal hygiene mentioned in this book tend to make one healthy and able to resist colds.
12. *If, after following the above suggestions, you are still troubled with colds, consult your physician.* One of the reasons for persistent colds may be foci of infection in the respiratory system. A thorough physical examination by a specialist might show adenoids, enlarged tonsils, or some infection of the ears or sinuses. The correction of such difficulties might involve some minor operation.

Even when a person is in good health and the nose and throat are in excellent condition there may be a susceptibility to colds. This may be due to a lack of proper antitoxin against colds in the blood. In such cases some of the vaccines for colds may be tried. They are still in an

experimental stage but seem to work well with some people. They confer immunity, however, for only a short time. The inoculation must be repeated often.

Try This

Write *Yes* or *No* after each of these statements. Every statement is either true or false. Let the class discuss each statement. How many will you get right?

1. A cold should require no attention.
2. Colds may be the beginning of a serious or even fatal illness.
3. Colds are a common cause of absence among employees.
4. Colds are not catching.
5. A cold in the head is called bronchitis.
6. The best way to cure a cold is to keep at one's regular work.
7. If you have a cold, try to get more sleep.
8. Colds are spread by coughing and sneezing.
9. Washing the hands is no preventive of colds.
10. Keeping the house too hot is one of the causes of colds.
11. When we close the windows in the fall, colds usually begin.
12. Fatigue has nothing to do with colds.
13. Colds are never serious enough so that one needs to consult a physician.

Interesting Things to Do

Make a campaign against colds in your school or room. Let each pupil absent himself from school promptly with the first signs of a cold and remain out until recovered. Let everybody carry out the suggestions in this chapter. Compare the absences due to illness in your school with those in the same grade in another school.

CHAPTER VI

ACCIDENTS: THEIR TREATMENT AND PREVENTION

59. Everybody needs to be trained to meet emergencies. It is much better to know how to prevent accidents than to be able to treat them. Accidents will occur, however,



WATCH THE TRAFFIC OFFICER

He is there to protect you if you will only let him

no matter how hard we try to prevent them. The person who knows what to do in case of a burn, sprain, cut, or other emergency will often be able to save his own life and the lives of others. For this reason many schools today give training in emergencies and first aid. In the remainder of the chapter the most important measures in regard to safety and emergencies will be discussed.

60. **Safety in crossing streets.** The streets today, with their crowded traffic, are more dangerous than an ordinary railroad crossing. Everybody should form the habit of looking to the left and to the right before crossing the street. Watch for cars coming around the corner. When it is safe to cross, go ahead without hesitation. If you get caught in the traffic, stand perfectly still. If you dodge, the automobile drivers will not know how to steer.

Do not forget to obey the traffic officer. It is his business to look out for your safety.

Cross at the street crossings only. The drivers expect people to cross there. Many accidents are caused by people stepping out into the middle of the street from behind a parked car.

When you do this you cannot see cars that are coming, and the drivers cannot see you.

Carry your umbrella high. If you hold it low you cannot see the traffic, and also you might injure somebody else's eyes.

61. **Be careful in your play.** It is not safe to play on the streets. Children should find a vacant lot or go to a regular playground. Many accidents happen in coasting on the streets. If you must coast in the street, take turns with your companions in guarding the street to give warning of approaching cars. If you ride a bicycle,



Wrong



Right

HOW MANY REASONS WHY?

signal like an automobile driver when you turn a corner. It is not safe to ride on the handlebars, because it hides the traffic from the one who does the steering. If you find it necessary to chase your hat or ball into the street, look out for automobiles. Better be safe than sorry.

62. Prevent falls. Between ten and fifteen thousand people lose their lives by accidental falls each year. Here are some suggestions for the prevention of accidental falls:

1. *Keep everything in its proper place.* After we have finished using tools, clothing, etc., they should be restored to their usual places. Stairways and sidewalks should be kept clear. Many accidents are caused by leaving rugs mussed up or furniture out of place so that people trip or stumble.
2. *Keep rugs and carpets free from holes.* Such holes may catch people's feet and cause them to fall. Especial attention should be paid to the condition of carpet on stairs. High heels may catch on the treads of a staircase. This is another good reason for wearing sensible shoes.
3. *Avoid leaning out of windows or over dangerous places.* Leaning over porches, banisters, and fire escapes should be avoided. When babies are around, it is desirable to screen the windows and install a safety gate at the stairs.
4. *Use a safe stepladder or a good substitute.* All stepladders should have their feet on the ground or floor and the braces set. Do not use a ladder of any kind which needs to be repaired. If a stepladder is not at hand and you must use a chair, take a strong one with a solid seat. Avoid the piano stool or a rocking chair.

63. Watch slippery places. Stepping unexpectedly on slippery places is responsible for many falls. Ashes, salt, or sand should be sprinkled on icy spots. Deposit fruit

peelings in rubbish cans. If other people are negligent, do a good turn as a citizen by picking the peelings up and putting them in a can. If that is not possible, kick them to the gutter, where they will not be likely to do harm. Beware of small rugs on polished floors, particularly if they happen to be near the foot of a stairway. It is surprising to note the number of people who in stepping upon a rug on a polished floor slip and fall.

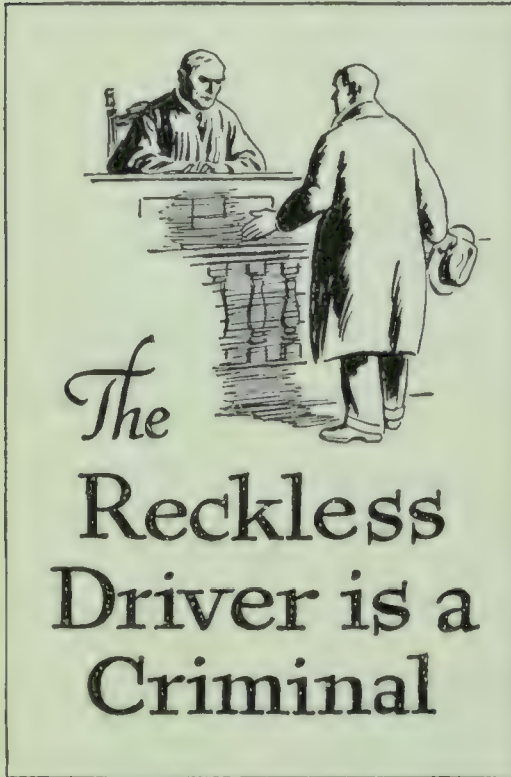
64. Other things to be careful about. It is always a good plan to wait until the car or vehicle stops before getting off or on. Small objects like marbles, gravel, and bits of wood often cause sprained ankles and falls. Look out for them and get rid of them when you see them. Do not go too close to the edge of elevations. The edges may crumble. Open elevator shafts are dangerous. Keep away from them.

65. Prevention of burns. During five years over fifteen hundred persons lost their lives in Canada through fire. Besides the fatal accidents there are thousands of minor accidents that cause much discomfort and pain. Most burns may be prevented.

The careless use of matches is responsible for many fires and burns. Matches should be kept in earthen or metal containers out of the reach of little children and where rats and mice cannot get to them. Burnt matches should never be thrown into a wastebasket, even when you believe that they are out. Use a flashlight or a safe lantern rather than a lighted match when you are searching for something in a closet.

If lamps are used, they should be filled during the day and away from a flame. One should never look for a leak in a gas pipe with a lighted match. Notice in your newspaper the number of accidents caused in this way.

Many fires are caused by the careless use of stoves and open fires. Oil stoves should be filled during the day and kept very clean. Stoves and furnaces should be regulated so that they will not get red hot. A gas stove or heater should not be connected with cheap rubber hose. Flexible



WHAT PROTECTION HAVE YOU AGAINST
RECKLESS DRIVING IN YOUR COMMU-
NITY?

metal tubing is safer. A stove or heater should be placed on zinc, asbestos, or cement. Loose paper should not be thrown on an open fire. The pieces of burning paper may be blown up the chimney and set fire to the roof or a neighboring building. Rolls of paper should be weighted down with a piece of wood, as they may unroll while burning.

Carelessness in building bonfires, in disposing of ashes, oily rags, and wastes, and in using gas and electric fixtures, stovepolishes, kerosene,

gasoline, naphtha, and cleaning fluids is responsible for many fires. Careless smoking is another cause of fires.

66. What to do in case of fire. If your own clothes catch on fire, lie down and roll. Do not run for help, as running will fan the flames. If somebody else gets on fire, get him to lie down, and wrap him tightly in a rug, blanket, or

coat. Begin to wrap near the head, to keep the flames away from the face. Beat out the flames or roll him on the floor.

If you discover a fire in a building, close all doors behind you, so that there will be no draft. If the smoke is very thick, tie a wet cloth or handkerchief around your nose and mouth to protect yourself against the smoke. If this is impossible, creep along on the floor, where the smoke is always thinnest. Remember that very few people lose their lives in burning buildings. Never jump from the window or roof. Keep your head. Wait for the fire department or other help.

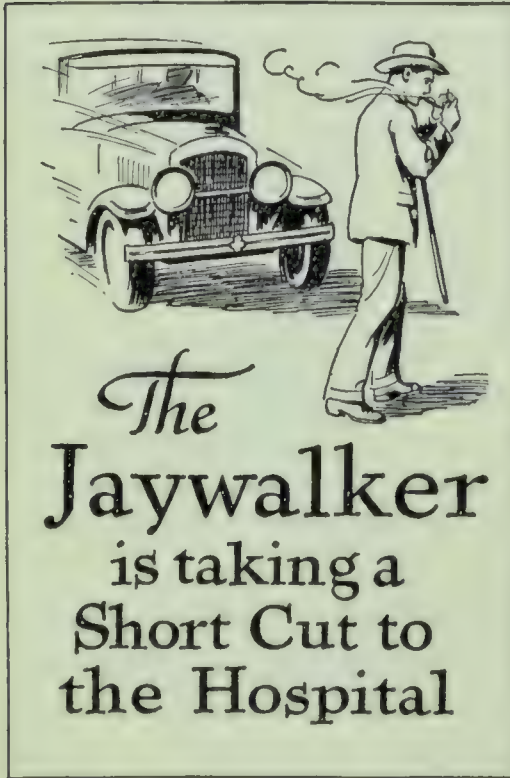
67. Care of burns. To treat an ordinary burn it is necessary to exclude the air and apply a nonirritant. Good dressings for slight burns are baking soda dissolved in water, starch or flour, ordinary or carbolated vaseline, olive oil, castor oil, cream, lard, or epsom salts. After applying the dressing, cover the burn with a piece of sterilized gauze and hold it in place by a bandage.

In case of a severe burn a physician should be called. Before the physician arrives the burns may be treated with the dressing noted above. If the clothing sticks to the burn, do not try to pull it off. Cut the cloth around the place and soak it off with castor oil or olive oil.

68. Care of sprains. Sprains are injuries of the joints. They are caused by stretching, twisting, and partial breaking of the ligaments around a joint. The pain is likely to be severe. The best treatment is rest and hot and cold applications. The patient should not move his sprained joint. The injured part should be elevated. The cold application may be crushed ice wrapped in a cloth. Ordinarily it is better to apply cloths wrung out of very hot or cold water. To get the full benefit from the hot or cold

applications they should be used for at least twenty-four or thirty-six hours. In case of a severe sprain a doctor should be summoned.

69. Treatment of nosebleed. Remember not to blow the nose. This prevents the clotting of the blood, which will



stop the bleeding. Put a handkerchief over the nose, hold the head back, and take slow, deep breaths. A cold application, such as cold water, cracked ice, or a piece of cold metal, like a key or the blade of a knife, will help. Sometimes a piece of clean folded paper pressed up between the upper lip and the gum will help to stop the bleeding.

70. Frostbite. The way to prevent frostbites is to wear warm clothing. The parts of the body that are most likely to be frostbitten and need to be protected are the

HAVE YOU STARTED A CAMPAIGN
IN YOUR SCHOOL AGAINST JAY-
WALKING?

ears, cheeks, nose, fingers, and feet. Rubbing the ears, cheeks, or nose when they begin to feel cold will often prevent frostbite. Any part of the body that is frostbitten turns gray or white. It is important to restore the temperature gradually or pain will result; do not allow the patient to go into a warm room. Rub the affected parts

with snow or cloths wrung out of cold water. If the skin is broken an antiseptic ointment (such as zinc oxide ointment) should be applied. The person who is frostbitten needs to be careful, for some time in the future, about exposure to the cold, as it will be easier to be frostbitten again.

71. Scratches, cuts, and other injuries which break the skin. The skin is a natural protection to the body. It prevents harmful bacteria from entering the body. Even the slightest injury to the skin, such as the scratch of a pin that draws blood, may give trouble if not properly taken care of. Blood poisoning is the name given to the dangerous condition which follows the invasion of deadly germs.

When there is any injury which breaks the skin, it is important to keep the wound clean and to kill any germs that may have gained entrance. Let the wound bleed for a time, as blood will carry off most of the germs. Avoid washing the wound with ordinary water, since the water may be impure. Paint around the wound with tincture of iodine. Cover the wound with sterile gauze. Do not cover the wound with court plaster or cotton batting, since neither of them is sterile. If you cannot find gauze, use a clean handkerchief or towel. Never touch the wound with your hands, as they may not be clean. Wounds received from rusty nails need special care, as such wounds are especially liable to infection.

To remove splinters use tweezers, or put a knife blade against the splinter and then hold it with your thumb-nail. Before using a needle to remove a small splinter under the skin, dip it first in boiling water or pass it through a flame. Call a doctor if the splinter is large or deeply imbedded.

Consult a doctor in case of an animal bite. Squeeze the wound so that it bleeds freely. Scrub it with any good soap.

Clotting may be hastened by putting a piece of sterile gauze over a wound. If blood spurts from the wound, it is a sign that an artery has been cut. Under such conditions tie a handkerchief or a bandage loosely on the side next to the heart. Twist it tight with a stick. If the bleeding is severe, call a doctor at once.

72. Poisoning. When a person has swallowed poison, send for a doctor at once. Do not wait for him to arrive. Try to get the entire contents out of the stomach by producing vomiting at once. Running the finger down the throat will often produce vomiting. A teaspoonful of mustard or salt in a glass of water is a good emetic. Between the attacks of vomiting, plenty of lukewarm water should be taken to dilute the poison in the stomach.

Try This

Write a brief statement about each of the following.

1. The frequency of automobile accidents in your community.
2. One way to prevent automobile accidents.
3. What your school is doing for safety.
4. How to cross the street.

Interesting Things to Do

1. Find out from your druggist whether he carries first-aid kits. What do they contain? Report on these facts to the class.

2. Plan an imaginary vacation trip. Make a booklet. Illustrate it with material taken from time-tables, newspapers, and magazines. Make definite plans as to how to keep healthy.

CHAPTER VII

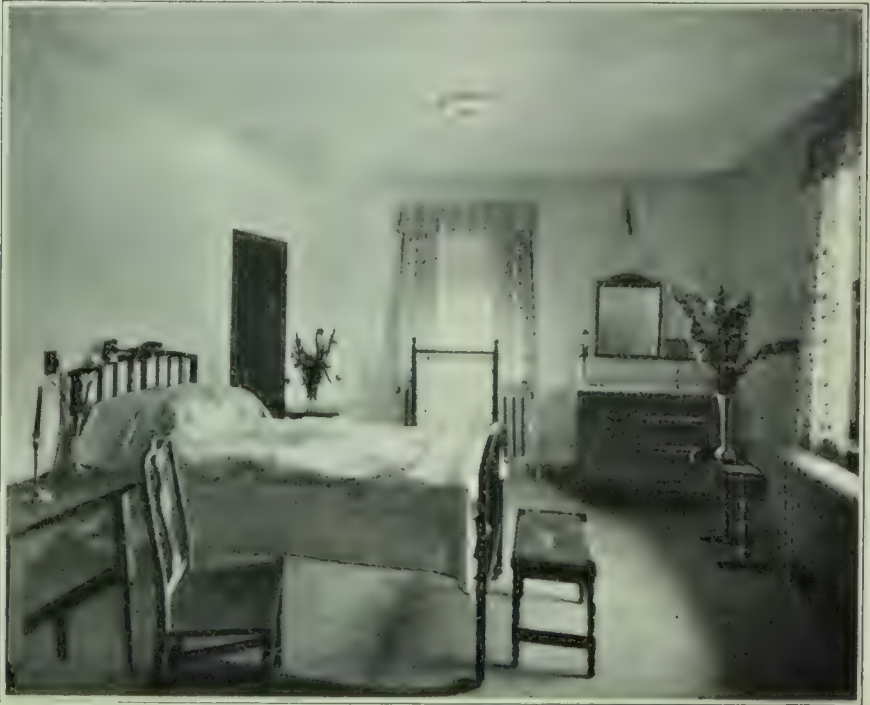
NURSING IN THE HOME

73. Knowledge of home nursing a necessity. Although many people expect to go to the hospital when they are seriously ill, yet some of them, by force of circumstances, must be cared for in their homes. Besides the more serious illnesses there are the minor ones that no family escapes. It would be exceptional to find a family in which somebody did not have a minor illness during the year. Invariably such illnesses are cared for in the home. It is estimated that about 80 per cent of the sick people in Canada are cared for in their own homes. Upon the character of the home nursing depends the recovery of the patient and the safety of other members of the household, especially in a case of communicable disease. Every person should therefore have a certain amount of training in home nursing.

74. Early recognition of illness. It is important to recognize the symptoms of an illness early, both for the welfare of the patient and for the protection of the family. Any marked variation from the normal, such as feverishness, loss of weight or of appetite, inability to sleep, coughing, vomiting, looseness of the bowels, and sore throat should be noted. In any case of illness, no matter how slight, it is always wise to recommend resting, getting more sleep, and eating lightly. Some people have the idea that it is the best plan, when one is ill, to stay on his feet as usual and "wear out the disease." This is a false notion, be-

cause such an expenditure of energy leads to exhaustion and so encourages the illness. If the patient has fever and is distinctly uncomfortable, it is wise to summon a physician.

75. The sick room. Except in very hot weather or in a case of measles a room with a southern exposure is



AN ATTRACTIVE SICK ROOM

Pleasant surroundings aid the patient to recover

desirable. It is likely to be more cheerful, since it will get a certain amount of sunshine each day. It may also be more sanitary, because direct sunlight is a disinfectant.

The sick room should be well ventilated night and day. It should be possible to open windows at the top and bottom. To protect the patient from drafts a screen may be put in front of the window or a sheet may be stretched along the side of the bed and fastened to the posts at

head and foot. In some cases the best results may be secured by putting a window board several inches high under the lower sash. Once or twice each day the room should be thoroughly aired by leaving doors and windows open until the air has been completely changed. The patient should be well covered during this time.

The temperature in the sick room should be between 65° and 68° F. If the patient feels cold, he should be made comfortable by blankets and hot-water bottles.

Ordinarily it is not desirable to darken the room, as it imparts a feeling of gloom, but care should be taken that the light does not shine in the patient's eyes.

The strain of caring for a sick person may be relieved by having few furnishings in the room. This facilitates the cleaning. Carpets and heavy window hangings are undesirable, since they catch the dust. Dry dusting or sweeping is never permissible in a sick room. Dustless mops and dusters or dampened cloths are desirable instead of brooms. Except for the noise, which is usually no serious objection, the vacuum cleaner serves a good purpose.

76. Keeping the patient cheerful. One of the faults alleged against doctors and nurses is that they "treat cases rather than people." Besides the physical illness from which he suffers, the patient has a mind. In the midst of trying situations he may be calm, hopeful, and cheerful or gloomy and depressed. Unless the patient can be kept cheerful it will be difficult for him to recover even under the best medical and nursing attendance.

There are many things which contribute to this cheerfulness. The room should be neat and orderly. Attractive pictures brighten a room. If possible, there should be a simple paper on the wall. One of the authors of this

book recalls vividly a nervous condition fostered in a severe illness by a vine in the wallpaper design which invited him again and again to count the number of flowers on the vine. If the patient is able, light reading and a few guests help to make the illness more endurable. The



AN EXCELLENT NURSE

It pays to keep the patient cheerful

attitude of the nurse is exceedingly important. She needs especially to be cheerful and hopeful.

77. The nurse's health.

Sometimes the nurse becomes so devoted to her task, along with other duties of the household which she may carry, that she forgets her own health. This is a calamity, since the patient is necessarily affected. Her own sleep, diet, and outdoor recreation are essential. A tired, sleepy nurse is in no condition to minister cheer-

fully to the patient or to carry out the doctor's orders.

78. The patient's bed. A comfortable bed kept in proper condition is essential to the welfare of an invalid. Usually the patient's own bed is best, since anything more or less unusual is likely to annoy one who is sick and to make him imagine that he is more ill than he really is. An iron bed is preferable, since it is easily kept clean and disinfected.

The nurse should endeavor to make up the sick bed so that it looks neat; the sheets should be drawn tight

so as not to cause friction, and the covers should be held firmly in place so as to secure the greatest comfort for the patient.

79. Taking the temperature. In health there is little variation in a person's temperature. The normal temperature is about 98.6° F. As the body gets warmer on a hot day, the blood rushes to the surface, where much of the heat is lost by contact with the air. Perspiration breaks out over the skin, and the body is cooled by evaporation. As the body gets chilled we shiver. This helps to raise the temperature of the body through the contraction of the muscles. By such methods the body undertakes to maintain its constant temperature. When it is unable to do so, it is a sure sign that something is wrong. The temperature is very important; a high temperature is a sign of illness, and any change in temperature indicates with remarkable accuracy whether the patient is improving.

In taking the temperature, first wash the thermometer in cold water, then shake it until it registers not more than 96° F. Next put the thermometer in the patient's mouth with the bulb under the tongue. The patient should keep his lips closed. At the end of two minutes remove the thermometer and record the temperature. It is important to remember that a thermometer should never be placed in the mouth of an infant, frightened child, or unconscious patient.

80. Care of communicable diseases. To prevent the spread of a communicable disease to the nurse, to other members of the family, and to the neighborhood, accurate attention to details is necessary. Disease is caused by germs. Most of these germs leave the body through the discharges of the nose, throat, bladder, or bowels. Water, milk, food, insects, unclean hands, towels, drinking cups,

handkerchiefs, and spray from the nose and throat may be the means of transferring disease from one person to another.

The first essential is isolation. The patient should be put in a room alone and kept apart from other members of the household so far as possible. Children especially should not be admitted to the sick room. Discharges from the patient's body should be disinfected promptly. Discharges from the mouth and nose should be received on gauze or paper, put in paper sacks, and burned. Soiled linen should be soaked in a tub (preferably in the room) containing a disinfectant such as cresol (2 per cent solution) or carbolic acid (5 per cent). It might be more convenient in some cases to put laundry into a clean laundry bag and have the bag and contents boiled. Dishes and silver should be sterilized in hot water. To prevent their being used by other members of the family it is desirable not to have them leave the room. The bowel and urinary discharges should be received in glass or porcelain receptacles and a strong disinfectant added. The discharges should remain in the solution for an hour before being removed.

Not long ago it was common, after the recovery of a patient, to disinfect the sick room with formaldehyde gas or by burning sulphur. This practice was based on the theory that germs are in the air, and that they cling tenaciously to things outside the body. Scientific experiment has shown that germs are really frail creatures that can live outside the body for only a short time. Disinfection by poisonous gas was shown to be expensive and useless. In place of such disinfection it is now recommended that the sick room be cleaned with soap and water, or with bichloride of mercury, and be exposed to the sunshine.

Questions for Class Discussion

1. Why should everybody have some knowledge of home nursing?
2. What are some of the common symptoms of illness?
3. What room should you choose for a sick room?
4. What adaptations should you make for the room that is to be used for a sick person?
5. How may the nurse care for her own health?
6. What are the most important suggestions that you would give the nurse in caring for her patient?
7. How may the spread of a communicable disease to some other member of the family be prevented?

Interesting Things to Do

1. Volunteer to be a home nurse when some member of your family is ill.
2. Get a doctor or nurse in your community to talk to your class on home nursing.
3. After consulting your librarian, report to the class the names of some good books on home nursing.
4. Let different members of the class report further on home nursing.

CHAPTER VIII

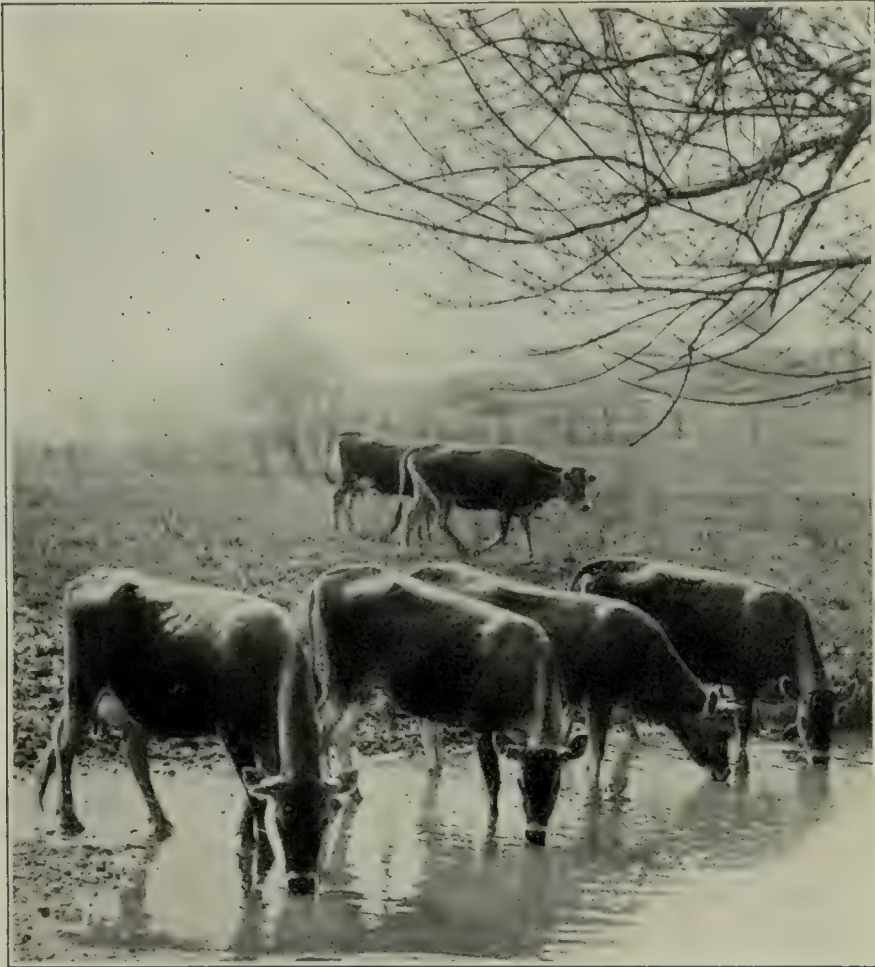
SAFE MILK AND WATER SUPPLIES

81. The romance of milk. The story of milk is very old. It goes back to the very dawn of history. In some of the oldest books and on some of the ancient monuments we find stories of herds, milk, butter, and cheese.

In Bible times milk not only was considered valuable but was the symbol of great things to be desired. When the Jews left the bondage of Egypt and marched toward Palestine, they sent spies ahead to give a report of the country. These men returned to their countrymen and reported it not as a land of jewels and gold but as "a land flowing with milk and honey." There are some fifty references to milk and cows in the Old Testament. Probably the vigor of men like Abraham, Jacob, and David was the result of their living much in the open air and using plenty of milk. Down through the ages milk, whey, cheese, and butter have played an important part in the lives of the great peoples of history.

82. Modern science as a detective. Communicable disease always leaves tracks behind it. Modern science is often the detective who attempts to track down the criminal. Today, as soon as a case of communicable disease is reported to a health department, the department immediately sets out to find its cause and takes the necessary steps to prevent its spread. In such a study the milk supply is always under suspicion, because milk is a good food not only for people but also for germs.

83. Safeguarding the public health. Science has shown us how dependent we may be on others for good health. The majority of people know little or nothing about the history of the milk before it is delivered at their homes.



ARTISTS AND SCIENTISTS DELIGHT IN HONORING THE COW

She is one of the builders of modern civilization

It may be contaminated and filthy or it may be clean and wholesome. Every citizen of our Dominion should know how the local boards of health safeguard the health of the people. Every citizen should also inquire carefully

into the quality of the milk that he buys for his family. His choice of milk may determine whether they have sickness or health. This inquiry may be made by reading health reports or by personal investigation. The pages which follow tell the story of how safe milk may be produced.

84. Healthy cows. The first requirement in the production of safe milk is healthy cows. Often there have been



THEY ALL DRINK MILK

outbreaks of communicable disease that could be traced directly to a diseased herd. Any animal that shows signs of illness should be kept from the remainder of the herd until treated and pronounced healthy. Since bone tuberculosis may be transmitted through milk,

all cattle should be tested for tuberculosis. This is made possible through a scientific test called the tuberculin test. In some cases the cows need to be killed. Under all conditions the milk from such animals should be excluded. On the best dairy farms the herd is regularly inspected by a veterinary.

85. General cleanliness. Every care should be taken to keep the cows clean. Pastures, barnyards, and lanes that are free from mudholes make it easier to keep the cows clean. Most dairies find that one of the best advertisements of their product is general cleanliness.

Cow barns should be clean, dry, well ventilated, and well lighted. Manure should be regularly disposed of and every effort made to prevent fly nuisances. Barn floors made of concrete are easiest to keep clean. Ceilings should be tight enough to prevent chaff and dust from sifting through. A whitewashed stable not only looks



A MODEL COW BARN

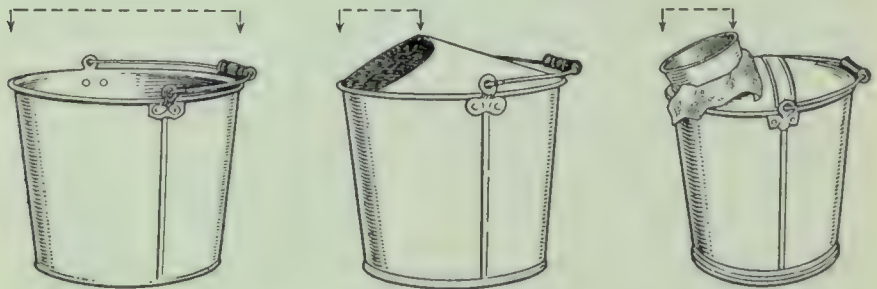
Notice the cleanliness of the barn, the cows, and the milkers

more sanitary but is more sanitary, since whitewash is a disinfectant. A barn should be whitewashed at least twice a year.

Cleanliness in milking is very essential. Much of the dirt in the milk comes from the cows during milking. Cows should be curried and kept as clean as possible in the stable. Just before milking, the flanks, udder, and belly of the cow should be wiped with a clean wet cloth and carefully dried. Since most of the dirt in the milk falls from the body of the cow at milking time, the

advantage of a hooded milk pail is apparent. Such a pail has a smaller opening and shields the milk from the falling dirt (see illustration below). This kind of pail reduces the number of bacteria.

The kind of can the dairyman uses is less important than his method of cleaning and caring for the cans. Dirty cans cause milk to sour and give it a bad flavor. Cans should be thoroughly washed and sterilized with boiling water before any milk is put into them.



DIFFERENT KINDS OF MILK PAILS

One of these milk pails is best. Which one? Why?

In our best dairies the milk is cooled quickly. The bottling is done by machinery, so that human hands do not touch the bottle until it is capped. Previous to the filling and capping, the bottles are sterilized by live steam. The best kind of milk cap is one that fits down over the top and so prevents contamination from handling.

86. The health and health habits of milkers. In most cases contagious disease has its origin with human beings. The milker or handler of milk who is ill or is a carrier of disease is a menace to the milk supply. A single carrier of disease has been known to start an epidemic in a community. For this reason men who milk or handle milk should be examined from time to time to make sure

that they are not suffering from disease. In our best dairies the workers are very careful in their personal habits. The milkers wash their hands with soap and hot water, not merely once or twice a day but after each cow is milked. They are also dressed in white clothes, which are changed frequently.

87. Transportation of milk. Even after milk has been carefully produced on a clean, safe dairy farm it may become unsafe because of bad conditions of delivery. It is desirable that the milk should be cooled immediately after milking, and kept cool until delivered to the consumer. Milk is an ideal place for bacteria to grow, but they do not grow fast in the cold. A single bacterium at 50° F. increases to only 5 in twenty-four hours, but when held at 70° F. for the same length of time it increases to 750. Since much of the milk used in cities often comes a distance of several hundred miles and is many hours on the road, the necessity for refrigeration is clear.

88. Pasteurization the greatest safeguard. Fortunately science has found a way properly to safeguard milk against the spread of disease without lessening to any great extent its food value or greatly increasing the cost of its production. This method is called pasteurization, after the great Pasteur. The milk is heated to 145° F., kept at that temperature for half an hour, and then rapidly cooled to 50° F. By such a method all disease germs are killed and the milk is made perfectly safe.

The only real objection to pasteurized milk is that it destroys one important food constituent, but this defect can be safely met by eating plenty of fresh fruit and vegetables. Little children fed on pasteurized milk should be plentifully supplied with orange juice.

89. The romance of water. Man's need of water is one of the great forces of history. Everything that lives must have water or perish. This need has determined where, and to some extent how, man should live. Not only did he need water to drink and use as a part of his food, but he needed it for his flocks, his grain, and his vegetables, and for purposes of navigation. Often he used the waterfalls to turn the wheels of his mill.

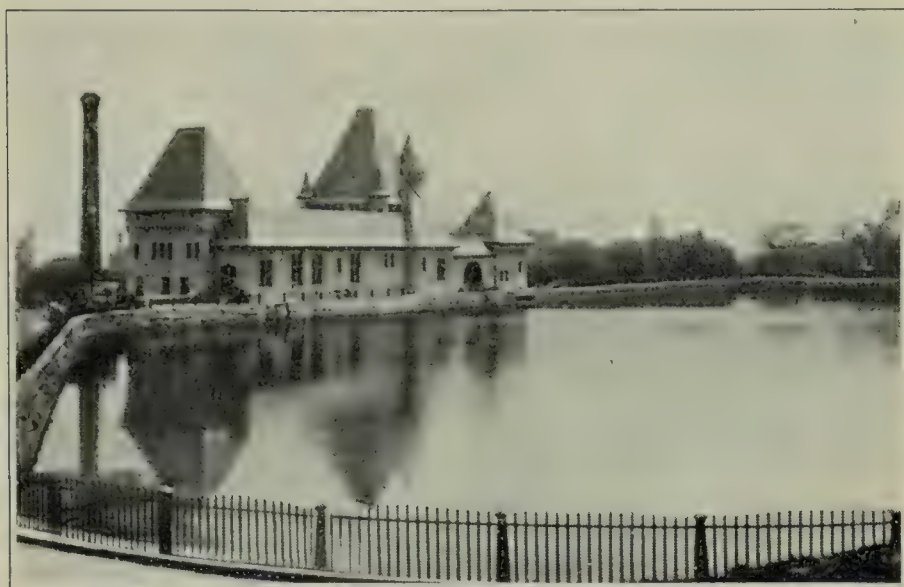
90. Science again a detective. Although water is such a positive help to man, it may, when infected, become a menace to health. In case of an outbreak of disease known to be transmitted by water it is always under suspicion. Among the water-borne diseases are typhoid fever, cholera, and dysentery.

In 1909 one of the most striking epidemics occurred in Montreal. There were over three thousand cases in a city having a population of 450,000. It was found that the outbreak was due to the pollution of the water supply of Montreal by sewage from Verdun, whose sewage outlet was near the water intake of Montreal. Ice forming near these pipes conducted the sewage almost directly into the Montreal intake.

Because of the great pains taken by cities to make the water supply safe, typhoid has now disappeared in large measure. In fact, city water is likely to be much safer than water drawn from a well in the country.

91. Protection of a city water supply. Some of the smaller cities and many towns that are not near lakes or streams rely on deep wells. Care is taken that the tops of the wells are protected against the invasion of surface water. Such water may be pumped directly into mains or stored partly in reservoirs. There is little danger of infection through this method.

Some cities draw their water from rivers or lakes or artificial reservoirs. Large cities like Ottawa and Vancouver have made reservoirs at tremendous expense. People are forbidden to live near the sources of supply, and the territory is always carefully policed to prevent contamination. Water so protected and exposed to air and



McTAVISH RESERVOIR AND PUMPING STATION OF THE MONTREAL
WATER WORKS

A high-level reservoir to which water is pumped from the filtration plant

sunlight is likely to be perfectly safe; even if it is exposed to some slight infection at its source, the bacteria will die before they have traveled the long distance to the water mains of the city.

Some cities and towns must draw their water from sources that are known to be infected. Thus, Toronto draws its water from Lake Ontario, where its sewage is also emptied. In such cases the supply is drawn from points as far distant as practicable from the place of

sewage disposal. Science is then brought to bear to purify the water so that it will be perfectly safe. This is one of the greatest discoveries of modern times.

92. Purification of water for community use. The methods used to prepare water for drinking and all other domestic uses will vary with the sources of the natural water.

1. Natural waters that look clear and sparkling and have an excellent taste often contain the organisms which cause disease, and these must be removed before the water is fit for use.

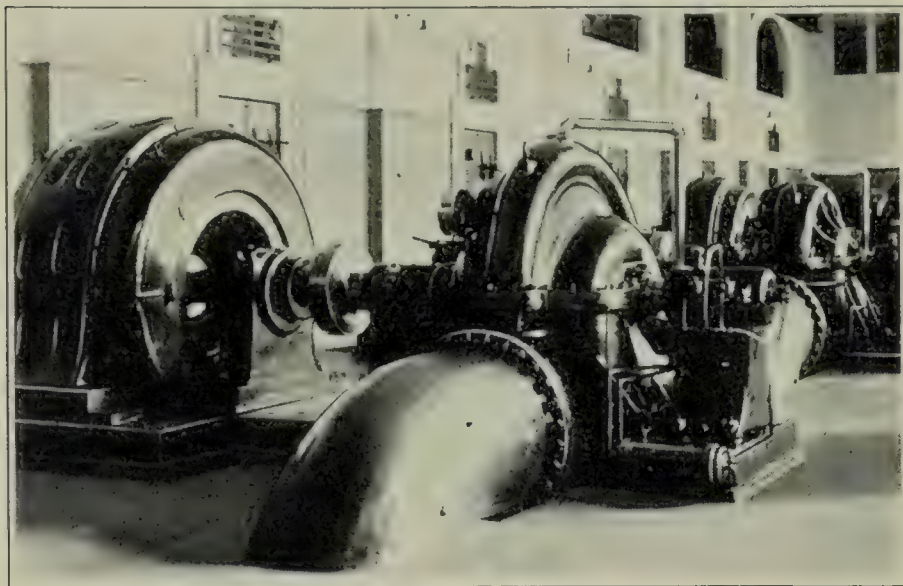
2. Other waters that are exceedingly muddy and "hard" may contain relatively few microscopic organisms. When such a water is used to supply a community, the only problem is to clarify the water. Sometimes the water is also softened at the community plant, but this is not often done.

3. Still other natural water supplies may be muddy and may also contain many organisms which endanger the health of the community. In such a case the water has to be clarified and also purified and made safe from a bacteriological standpoint.

In the first case all that is necessary is the addition of a chemical which acts as a germicide, that is, kills the germs in the water. A 1 per cent solution of chlorinated lime is very often used to purify community water supplies. By means of an automatic arrangement the lime is added in just the right amount to sterilize the water.

In the second case the water is pumped from the stream into settling basins, where a part of the suspended impurities settles to the bottom. Sometimes a chemical such as alum is added to the water. The alum, when mixed with the organic matter suspended in the water, forms a gelatinous compound which settles easily. The

water is usually allowed to settle in one basin and then run into another, called the coagulation basin, where the alum is added, and from there the water is piped to the filter beds, where it trickles slowly through layers of sand. The filter beds may be about 125 feet wide and 300 feet long. Each bed has a layer of sand about



LOW-LEVEL PUMPING STATION AT MONTREAL

These are some of the large pumps which force water to all parts of Montreal

40 inches deep. Under the sand there is a layer of gravel about 3 feet deep. The bottom of each filter bed is of smooth concrete which slopes toward a drainpipe that serves to collect the water into a pure-water reservoir.

In the third case, if it is necessary also to sterilize the water (remove germs), chlorinated lime may be added to it, or it may be "charged" with a definite quantity of chlorine gas as it is passed from the settling basins to the filter beds.

About fifteen hours is required for the passage of water from the intake to the city main.

The filter beds are cleaned by sending a current of water upward through the sand while the incoming water is shut off. The water washes the sand and is then discharged into a sewer.

Sometimes the water is softened by being passed through a softener containing a compound called permutite. The calcium and magnesium of the compounds which make the water hard replace the sodium in the permutite. Since the silicates formed are insoluble, these two metals are thus removed from the water.

After the epidemic of 1909 Montreal took steps to obtain an improved water supply, and now the Montreal water system ranks among the finest in Canada. The intake was altered and the water was chlorinated. Then filtration was resorted to, and as a result the deaths from typhoid have been materially reduced. The following table shows the effect of the successive steps:

TYPHOID DEATHS IN MONTREAL PER 100,000 POPULATION		
1906-1910	Previous to chlorination; untreated water .	40.3
1910-1918	Chlorinated water	21.9
1919-1925	Chlorination and partial filtration	9.0
1926-1929	Chlorination and filtered water exclusively .	4.4

93. What soap does to water. Soap is an aid in washing greasy dirt from our hands and clothes because it forms an emulsion with the fat. It is easier to wash out the emulsion than the grease. By an emulsion we mean the mixture of the fine particles of one substance with another substance. In this case the particles of soap solu-

tion mix with particles of fat and dirt and hold them in suspension so they can be washed out.

94. Individual responsibility for safe water. Most people in cities have nothing to do with the water supply. They pay their water tax, draw their water from a faucet, and assume that it is safe. Since the greatest care is ordinarily taken by cities to protect the water supply, this faith is justified. They hold the city government responsible for the safety of the water. In certain cities people who proved that they had become ill through drinking city water have been awarded damages by the courts. This has tended to make cities even more watchful of the public health.

In the outskirts of cities, in small towns, and in rural districts people still use wells and springs. Over these sources of supply, government authorities exercise almost no control. Whether the water supply is safe or not usually depends on the intelligence and care of the householder himself. Since many people are either ignorant of modern science or exceedingly careless, infections from drinking-water are common. Added to these dangers is the ease with which wells and springs may be contaminated.

95. Safe wells. A shallow well is likely to be more dangerous than a deep well, because it is easier for it to become infected with contaminated surface water. Wells should never be located within 100 feet from an outhouse, and if possible they should be on higher ground than the house. Contrary to the general notion, infection usually comes through the surface of a well rather than through the soil. The latter may occur, however, when a source of infection is near at hand, such as a privy or broken sewer pipe. In constructing a well great care should be taken to have the casing of the well (usually of wood,

stone, or brick) project about 18 inches above the ground. Around this should be built a shield of concrete, or of brick set in cement. The floor or platform over the well should fit so closely to the top of the casing that there is no place for frogs, bugs, or mice to crawl in. The floor



THE PROTECTION OF A SPRING AGAINST POLLUTION

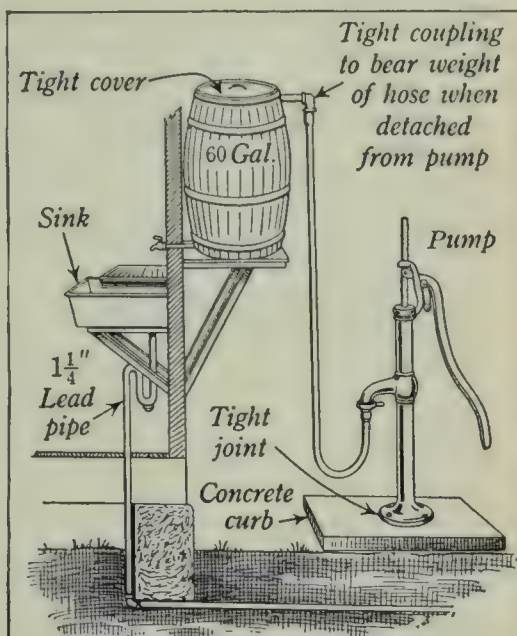
Enumerate various ways in which the water in the spring at the left may be contaminated. How is the water protected in the spring at the right?

should be made of cement or well-joined lumber, so as to prevent leakage. It is through such leakage that a well may be contaminated. It is important that the pump should be protected in such a way as to prevent water from draining into the well.

Deep wells furnish us with the safest and most satisfactory supplies of water. Care should be taken also with deep wells to prevent infection from the top. The land should slope away from the top. Pipes near the surface should not be allowed to rust and become leaky.

Even water that is perfectly safe when it comes from the well may be made unfit by the unclean habits of those who handle it. Disease may be carried by a drinking-cup.

96. Safe springs. Spring water is subject to all the dangers of water from a shallow well. Special care needs to be taken against pollution. Stables, privies, and hog pens should be distant and preferably on another slope. Animals should be kept away. A wall of concrete or masonry, going well into the ground, should protect the spring against surface washings from above. A ditch dug around a spring will help to prevent the flowing in of surface water. Grass planted around a spring will help to keep out the dust and prevent the wearing away of the soil. On page 104 note how a spring has been made safe.



INEXPENSIVE ARRANGEMENT FOR SUPPLYING SINK WITH RUNNING WATER

Useful for summer camp or cottage

97. Disposal of sewage. In our larger cities the individual citizen has very little responsibility as to sewage, since the city takes care of this by its system of sewers; but in the outskirts of the large cities, and in towns, villages, and rural communities, the individual is responsible. Privies and cesspools should not be tolerated in a closely built area. There are statistics which show that getting rid of privies and installing a sewerage system have re-

duced the death rate in many cities. Where this is impossible a pit or earth privy or a septic tank may be used. It should always be distant from the well and very carefully screened against flies. In many country homes indoor closets have been installed and a water tank located in the attic. This provides for such convenience and in large measure for such safety as are found in the city. The sewage is conducted by pipes to a large cesspool. If this is properly located, it should not be a menace. Through the installation of modern plumbing the sanitation in rural communities is rapidly improving.

98. Vacation hints. One of the hazards of travel is the possibility of infection by impure water and milk. Whenever possible we should insist on pasteurized milk in public restaurants. If we are camping in the country, it is wise to make an investigation of the milk supply, to find out the condition of the herd and the cleanliness of the milkmen. If there is any doubt about the purity of the milk, it should be pasteurized at the camp.

In these days of automobile traffic the highway water supply is very important. Ordinarily the automobilist assumes that if water is clear, cold, and pleasing to the taste, it is safe to drink. In spite of all these qualities it may, of course, be very dangerous. Some departments of health placard wells along the highway, for the information of the tourist. In case the automobilist or tourist is suspicious of the water, it should be boiled. Beating with an egg beater the water which has been boiled will improve its taste. Nearly all departments of health will examine water free of charge, and should be asked to do so if one is the least bit suspicious of the water supply of a summer camp.



AN OLD-FASHIONED COUNTRY WELL

The old oaken bucket has become famous in song and story, but it should be regarded with suspicion. Why?

Try This

Write *Yes* or *No* after each of these statements. Every statement is either true or false. Let the class discuss each statement. How many will you get right?

1. The history of milk is quite recent.
2. Most of the peoples who have achieved great things in the world's history have used milk plentifully.
3. Milk is an ideal food for bacteria.
4. Milk may be infected during transportation.
5. Babies fed pasteurized milk should have orange juice.
6. Any milk sold in bottles is safe milk.
7. Milk should come from healthy cows.
8. The condition of cow stables has little to do with sanitary milk.
9. To prevent spoiling, milk should be kept cold.
10. The presence of water has determined much of our industrial development.
11. All cities draw their supplies of water from rivers or lakes.
12. Water may be made fit to drink by being treated with chlorine.
13. A citizen in the country has little responsibility for the purity of his water supply.
14. Springs are usually safe, no matter where they may be found.
15. Good sewerage is a necessity for comfortable and healthy living.
16. Clear water is always safe water.
17. Flies should always be kept away from sewage.

Interesting Things to Do

1. Collect the facts and write the history of the glass of milk which you drink at your table.
2. Collect the facts and write the history of the glass of water which you drink in your own home.

CHAPTER IX

GOOD APPEARANCE, HEALTH, AND POSTURE

99. Watching the crowd go by. It is interesting to stand on a street corner and take time to watch a crowd go by. How different every person is from every other person. They are stout, thin, tall, short, dark, fair, neat, unkempt, happy, sad, healthy, crippled, and so on. Each person is individual. As you watch the busy throng go by, you will notice that some of them seem much more attractive than others. It may be because of dress, facial expression, or charm of manner.

One of the striking things that you will notice is the way people walk. How ugly some of them look! There is a high-school boy with a shambling gait. Here is a middle-aged woman who waddles like a duck. Notice that high-school girl who is approaching. How thin she is! Her shoulder blades protrude, she is stooped, her chest is flat, and her head sags forward. When she looks up, you notice that she is pale. She has striking eyes and beautiful hair. Her smile is pleasing. Soon she is lost in the crowd, and you find yourself feeling sorry for her because she does not stand and walk correctly. If she had only mastered that art she would be an unusual-looking young woman. It may not be due to bad habits but to physical defects or malnutrition.

Ah, who is this coming? He may be an old man, for his hair is white and he uses a cane; but he carries himself better than most young men. It is Mr. Stoddard, "a soldier of the Queen." How tall, erect, and commanding

he looks. You feel that you are in the presence of an extraordinary personality. He is the hero of a hundred fights and a splendid citizen — and he looks it.

How unusual it is to see somebody who has a distinctive carriage! How bent and crooked nearly all of them, young



AN INTERESTING CROWD

How many have good posture? Study a real crowd. How many persons in ten have good posture?

and old, seem to be! There is somebody who is quite different. It is a college senior. He is well dressed, but that is not the most distinctive thing about him. Not only does he have good color and a splendid physique, but his abdomen is held well back, his chest is held forward, and his neck is erect and straight. He impresses you as one who is meeting with success and is destined to continue to

be successful. If you were the head of an educational or business establishment, and he applied for a position, you would feel favorably disposed toward him.

Perhaps you go home wondering whether you have a carriage that spells distinction and impresses other people with your personality. Probably you will stand before a long mirror as you naturally stand, and study your figure. If the examination is disappointing, you may comfort yourself with the fact that you can train yourself to have a better figure. It was Elbert Hubbard who said :

Keep your mind on the great and splendid thing you would like to do, and you will find yourself unconsciously seizing upon the opportunities that are required for the fulfillment of your desire.

All things come through desire, and every sincere prayer is answered.

Carry your chin in, and the crown of your head high. We are gods in the chrysalis.

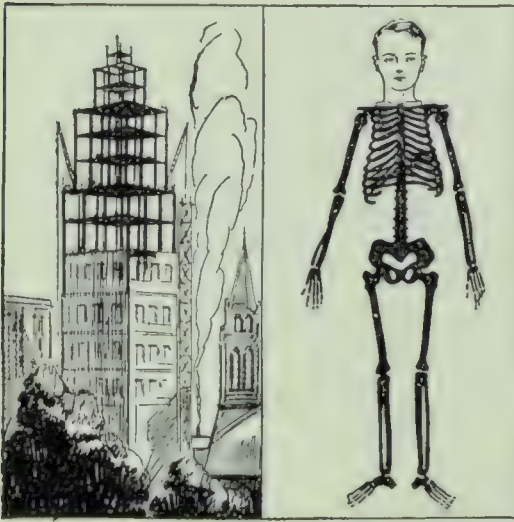
Then let us hope that this story ends, as all good stories end, with your setting out to improve your posture, and that you improve so fast that you surprise your friends and parents. The pages that follow will tell you how to do it.

100. Use of the bones. The shape which the body takes has much to do with appearance and good health. The bones help to give the body shape and to protect the delicate organs. Children who have rickets, for example, are likely to be bow-legged. There is a lack of mineral matter in the bones. They lack hardness, and so they bend. It would be impossible for us to have shapely and efficient arms if there were no bones. The whole body would be largely a shapeless and useless mass.

Many of the principal organs of the body are ingeniously protected by the bones. The delicate and important

brain is inclosed in and protected by the skull, a wonderful chamber made of bones. The ear and eye are also well protected. The heart, lungs, and digestive organs are fairly well surrounded by bones.

A third function of the bones is to serve as levers for the attachment of the muscles and tendons. Without the



A GOOD FRAMEWORK IS NECESSARY FOR
STRENGTH AND BEAUTY

bones we should not be able to stand or to walk.

101. The joints. Our movements are dependent also on the way the bones are joined together. These meeting places are known as joints. Some of the joints are immovable, like those in the skull, but the vast majority of them are movable. The principal kinds of joints are the ball-and-socket joint, the hinge

joint, and the gliding joint. An example of the ball-and-socket joint is at the shoulder. There the large bone of the arm is rounded out in the shape of a ball at the end, and fits into another bone which is hollowed out into a cup, or socket. The ends of the bones are covered with delicate membranes and lubricated. This kind of joint permits the free movement of the arm in many directions. The hinge joint, as the name implies, permits movements in two directions only. The joints at the elbow and in the fingers are of this kind. Good examples of the gliding joints are found at the wrist and in the spinal column.

102. Work of the muscles. The muscles may be attached directly to the bones. Usually they are fastened to stout cords called tendons, which are attached to the bones. Since the tendons require a much smaller space than the muscles, they are less bungling. For example, if muscles instead of tendons ran down to the fingers, the hand would be unwieldy.

The muscles are arranged in pairs. When one of the pair contracts, the other relaxes. In keeping ourselves erect and in proper balance the muscles work somewhat like a teeter board. The ends of the teeter board move in opposite directions. For example, when you let your head sink down, notice how the muscles under your chin shorten and grow thick. As you throw your head back, notice how these same muscles are stretched and become thinner. What is happening meanwhile to the muscles of the back of the neck?

Thus we see that to assume good posture we need to have a proper balance of the muscles. Stooping shoulders are due to the lack of tone or strength in the muscles of the upper part of the back. They have become too relaxed and elongated. The muscles of the breast, on the contrary, have become too short. The person with erect posture has perfect balance of the muscles.

103. Results of bad posture. One of the important results of a bad posture is ugliness of appearance. The boy or girl, man or woman, who stands, sits, and walks keeping the body erect looks young and commanding, and impresses you with a sense of personal power.

104. Bad habits the enemies of good posture. One of the chief causes of bad posture is the neglect to use the body in the right way. Many boys and girls get into bad habits. After these are formed, they have difficulty in

breaking them. Often this requires more than will power. They may need exercises to strengthen certain muscles and restore the bodily balance. Let us now consider some definite suggestions on the proper use of the body.

105. Correct standing position. The body is in a good condition mechanically when it is erect. In such a position the weight is distributed evenly on the two feet. The chest is elevated and is the part of the body farthest forward. The abdomen is in, or flat. The back curves are not exaggerated. By comparing the illustrations on pages 115 and 117 it is easy to see that correct posture must necessarily give the organs of the body a better chance to work. Is there any doubt that the person who maintains good posture is better able to do a strenuous day's work?

To understand what a good standing position is, study the positions on page 115. Study your figure in a long mirror. Should you rate yourself as *A*, *B*, *C*, or *D*?

It is sometimes said that clothes make the man, but is it not better to say that good posture enables one to show off his clothes to advantage? The man who is poorly clad excites a certain amount of favorable attention if he has an erect posture. The boy with stooped posture, after a course in military training, often emerges as a different-appearing person.

Bad posture interferes with the working of the vital organs. Our health and vigor are dependent on the action of the heart, lungs, digestive system, and other vital organs. If they do not have enough room and are displaced, they cannot perform their work, and ill health and disease may result.

Bad posture, since it interferes with the proper working of the body, increases the general fatigue. One cannot

EXCELLENT

GOOD

POOR

BAD



EXCELLENT POSTURE

1. Head up and chin in (head balanced above shoulders, hips, and ankles)
2. Chest up (this part of body farthest forward)
3. Lower abdomen in (and flat)
4. Back curves within normal limits



GOOD POSTURE

1. Head slightly forward
2. Chest slightly lowered
3. Lower abdomen in (but not flat)
4. Back curves slightly increased



POOR POSTURE

1. Head forward
2. Chest flat
3. Abdomen relaxed (this part of body farthest forward)
4. Back curves exaggerated



BAD POSTURE

1. Head markedly forward
2. Chest depressed (sunken)
3. Abdomen completely relaxed and protuberant
4. Back curves extremely exaggerated

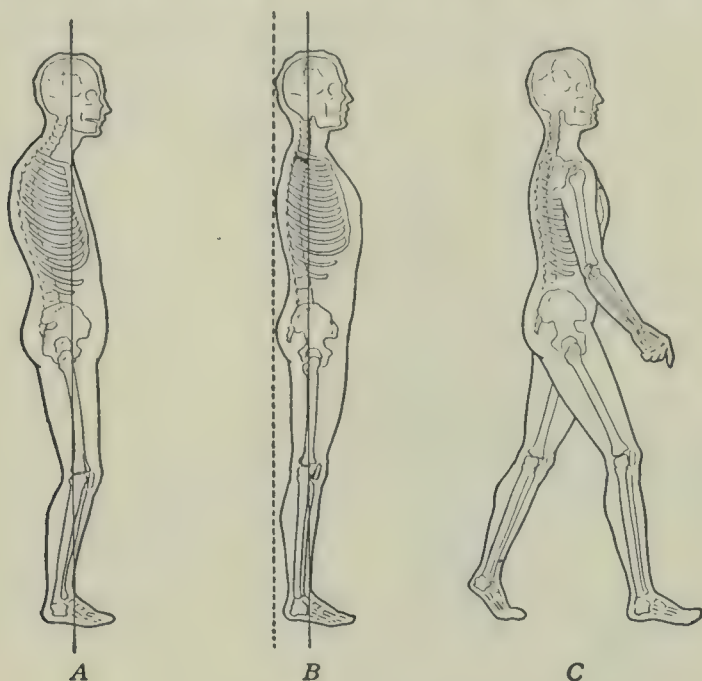
ARE YOU A, B, C, OR D?

perform his work easily unless he knows how to use his body. If you set a block up on end, you will notice that it stands without difficulty. If it is tilted forward, it is in unstable equilibrium. Human beings in such a situation strain themselves to keep their balance. Often they throw their stomachs forward and their shoulders back, making a decided hollow in the back. Such a position markedly increases fatigue. The posture just referred to is common when one wears high-heeled shoes.

106. Good health promotes good posture. The bones and the muscles depend for their strength on the general health of the body. Sleep, sunshine, nutritious food, recreation, freedom from disease, and all the health habits contribute to the health of the bones and muscles. If the muscles are not properly nourished, they lose their tone and become flabby, and the body tends to droop. Some people, because of habitual fatigue and general ill health, do not have enough strength to stand, sit, and walk in good posture.

107. Correct walking position. Walking is similar to standing except that there is movement. Running and the positions taken in athletic activities are merely modifications of the general position of walking. In walking the trunk should be kept erect. A common fault in walking is to turn the toes out. For the protection of the arches and for general ease in walking the toes should point straight ahead. The legs should swing freely; the heel should strike the ground first, but the weight should be quickly transferred from the heel to the ball of the foot, so that there may be a good push-off from the toes in the next step. Most people carry the weight of the body too far in the rear. It is much less fatiguing to carry the weight forward, so that all parts of the body are in a

straight line. Let the arms swing easily but with no exaggerated motion. The posture in walking should enable one to move the body forward gracefully and with the least effort. Running should be on the balls of the feet



BUILDING GOOD POSTURE

Try this exercise if you need it: suppose that you have very poor posture (A); by placing your head, shoulders, and hips against the wall, put yourself in good posture (B); try to hold this position and walk off (C)

and not with the foot flat. Running with a light step helps to strengthen the leg muscles that keep the body in an upright position.

108. Correct sitting position. Since most of us spend many of the twenty-four hours in a sitting posture, the kind of chairs we sit in and the positions we assume are exceedingly important. Unfortunately much of our school furniture is not suitable for use or is improperly adjusted. In general the sitting position should be such that the

muscles not in use are relaxed and the person is comfortable. A chair that is too high or too low, or too close to a table or desk or too far away, encourages bad posture. The chair should be of such a height that the feet rest comfortably on the floor, the knees not being elevated much above the level of the chair seat. In bending forward to



A CORRECT SITTING POSITION¹

Can you tell why?

work, care should be taken to lean forward from the hips with the spine kept straight.

109. Fashion and shoes.

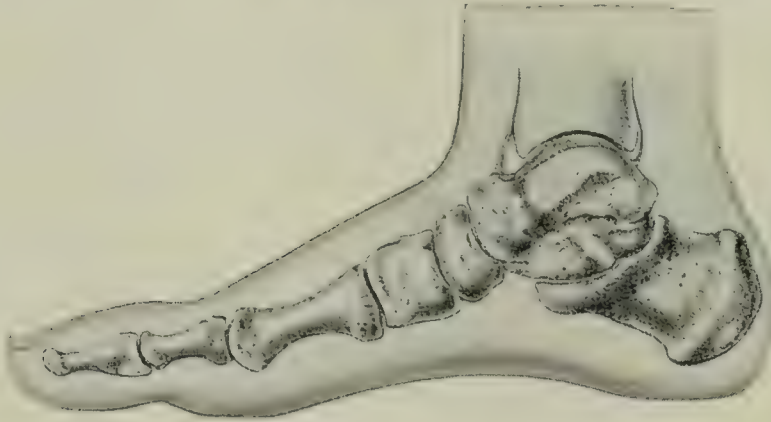
What crimes against good health are committed in the name of fashion! The vast majority of the people, especially young people, who buy shoes ask the question, What is the latest style out? Then they proceed to buy the pattern presented, regardless of looks, comfort, or health. The idea is not to fit the shoe to the foot, but to

force the foot to conform to the shoe. It is true that the salesman sometimes gives good advice, but usually he knows little or nothing about the hygiene of the feet, and simply wishes to make a sale. Under such conditions it is not strange that the majority of people have foot troubles. About 85 per cent of the men drafted into the Allied army during the World War had some kind of trouble.

¹ From Bennett's "School Posture and Seating," p. 93

with their feet. There are two important reasons for trouble with the feet: ignorance of the importance of the feet in maintaining good health, and unwillingness to take proper care of them.

110. The foot a marvelous mechanism. The foot is one of the wonders of the human body. It must be strong enough to bear the weight of the body and yet flexible enough to bend with ease in walking, jumping, and running. These



THE BONES OF THE FOOT

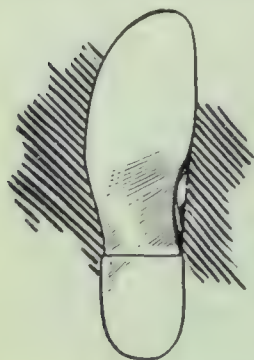
Notice the longitudinal arch

two needs are supplied ingeniously by the human foot. It has twenty-six bones bound together by many ligaments and controlled by muscles and nerves. These bones are arranged to form arches. The two principal arches are the longitudinal arch, extending from the heel to the great toe, and the transverse arch, extending across the ball of the foot. The arches are maintained by ligaments in much the same way as a bow is bent by a bowstring.

When the foot is misused by putting too much strain upon it or by wearing ill-fitting shoes, the arches may begin to sag and the bones slip out of place. Distress is bound to follow. Not only is there likely to be pain in the

foot itself, but such a disorder may cause backache, headache, continued fatigue, poor circulation, indigestion, and other serious disorders.

The most common type of foot ailment is flatfoot, or fallen arch. It is caused by a flattening of the long arch, which extends from the heel to the great toe. To determine whether you have a tendency toward flatfoot, moisten the bottom of your feet, shake off the excess, and step on a blotter. The normal print of the foot is narrow in the middle and wide at the heel and toes. The flat foot leaves an impression that is about the same for



WEAR A SHOE LIKE THIS FOR COMFORT, GOOD
POSTURE, AND HEALTH

its entire length.

111. Suggestions on buying shoes. The first essential in selecting shoes is to *buy a shoe that fits properly.*

Many people ruin their feet by buying shoes simply because they are cheap. They trust that after they are "broken in" they will be all right. The proper kind of shoe should be comfortable from the beginning. Do not buy the shoe that needs breaking in.

Take plenty of time when you buy shoes, so as to get a good fit. It will pay to use brains in buying shoes. Some retail stores have adopted the plan of encouraging the customer to look at his feet through an X-ray machine which they furnish.

A good shoe may be described as follows: It corresponds to the natural shape of the foot. The inner line from the heel to the great toe should be approximately

straight. The end of the shoe should not be so rounded or pointed as to restrict or press against the toes. Such a shoe is responsible for bunions, corns, and other troubles. The sole should be flexible. The thickness depends on the kind of service demanded. For comfort in walking on pavements a fairly thick sole is necessary. The heel needs to be as broad as the heel of the foot and comparatively low. High heels are responsible for much bad posture. A person who wears high-heeled shoes is able to keep his balance only by throwing out the stomach and hollowing in the back. Such a shoe also brings unnatural pressure on the arch and crowds the toes. Rubber heels are desirable because they absorb shock. The leather of a shoe should be flexible and pervious to the air. Patent leather, rubber, and similar materials may be useful to keep out water, but they should not be worn continually.



WEAR THIS AND WALK
INTO TROUBLE

112. Care of the feet. Common troubles with the feet are corns, blisters, and ingrowing toenails. Generally they indicate that ill-fitting shoes have been worn. While treatment will relieve the difficulty, the change to well-fitting shoes is necessary for cure and prevention. Blisters are dangerous because of the possibility of infection. The most careful precautions in regard to cleanliness should be observed. A broken blister should be dressed with aseptic dressings, preferably by a physician.

Special attention should be given to the bathing of the feet. After athletic games, hikes, or hard physical work the feet should be bathed. A hot bath is better than a cold one for the removal of deposits of perspiration and dirt. The hot bath should be followed by one in tepid or cold

water, to toughen the skin and protect the feet against the rubbing of the shoes. Stockings should be changed every day.

Choose the Best Ending

Notice that there are three ways of ending each sentence. Select the ending which is best.

1. Good posture is (entirely the result of eating the right kind of food) (usually a sign of health) (always the result of good habits).

2. Strong, healthy bones are desirable because they (are better able to support the body) (require less lime) (are a part of the body).

3. A joint is a point where (two muscles come in contact with each other) (a muscle and tendon are united) (two bones come in contact with each other).

4. The chief work of the muscles is (to connect with the bones) (to enable the different parts of the body to move) (to make the body beautiful).

5. We should form good habits of posture because good posture (always enables us to breathe better) (helps to keep our feet in better condition) (promotes the general health of the body).

6. To form good habits of posture (stay up at night frequently) (avoid the drinking of milk) (try every day to sit and stand in the proper way).

7. The chief physiological value of good posture is that it (gives the vital organs a better chance to work) (hardens the bones) (improves the personal appearance).

8. To walk correctly be sure (to have the toes pointing straight ahead) (to have toes in and heels out) (to wear high-heeled shoes).

9. In the best sitting position (the feet should not touch the floor) (the back of the chair should not be adapted to the shape of the back) (the feet should rest comfortably on the floor).

10. When you buy shoes (remember the qualities of a good shoe) (rely entirely on the advice of the salesman) (buy a shoe that is a little tight, so you can break it in).

Interesting Things to Do

1. With the help of your hygiene teacher or instructor in physical education try to find out whether your posture is graded *A*, *B*, *C*, or *D*. If you are not an *A*, get suggestions as to how you can improve your posture. Give yourself daily training.

2. Make a collection of shoes of all kinds. Let a committee from the class, one of whom should be your teacher, arrange the shoes in order according to their worth as healthful shoes. Let all the other members of the class take the test of arranging them in order.

CHAPTER X

BEAUTIFUL SKIN AND HAIR REFLECT HEALTH

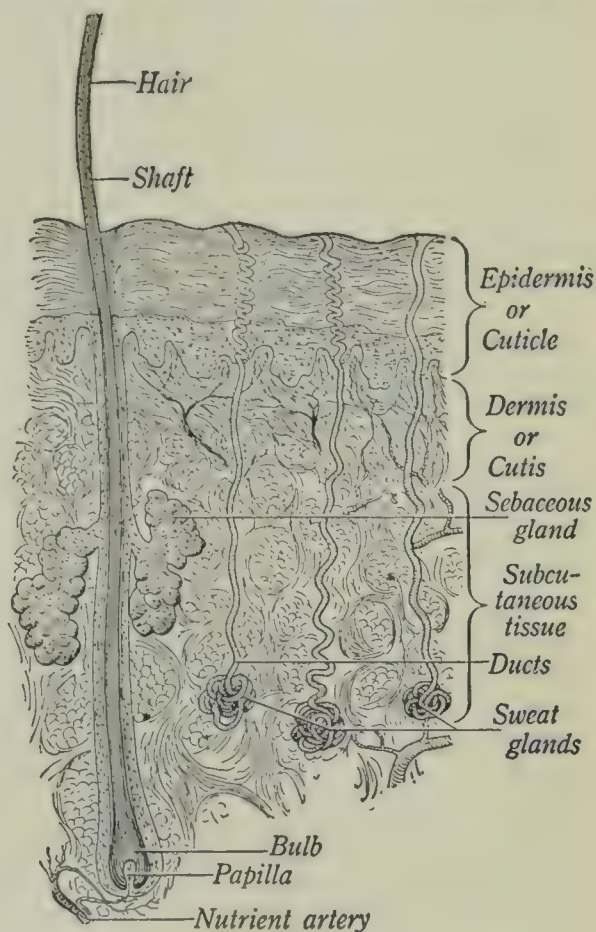
113. **The natural desire to be good-looking.** Good looks, like gold and precious stones, have always lured men and women to undertake remarkable adventures and do most unusual things. At the very dawn of history we find that women had vanity cases and that both men and women resorted to tattooing and fanciful dress to attract attention. Among savage tribes even facial disfigurement, like slitting the ears, and blackening the teeth by chewing the betel nut have been among the curious and mistaken methods of attempting to add to personal charm.

While there are many things that contribute to good looks, everybody will agree that one's physical attractiveness is largely dependent upon the appearance of the skin and hair. The regularity of the features of the face is important, but a Venus with a sallow, blotched, pimply face would not be a Venus. An irregular face with a good clear skin crowned by a luxuriant growth of glossy hair immediately impresses one with its attractiveness, not to say beauty. This is true of boys and men as well as of girls and women, although the former are a little more reluctant about admitting it.

The purpose of this chapter is to indicate how the hair and skin may be properly cared for. Let us first consider the skin.

114. **Structure of the skin.** The skin is a tough, flexible membrane which protects the tender flesh underneath.

The outer layer, the epidermis, is especially tough, dry, and hard in exposed places like the palm of the hand and the bottom of the foot. It is without blood vessels and nerves and is united to the dermis, or true skin, underneath by an adhesive-like substance. The lower layers of the epidermis are composed of living cells that are nourished by the lymph, a fluid which flows through canal-like spaces between the cells. These are very soft and spongy, and are continually dividing and growing. As they migrate upward farther and farther from the seat of nourishment they get drier and harder, and die, but remain good protectors. As they become worn off they are continually replaced by the growing cells underneath. The pigment that chiefly distinguishes the black or red man from the white man is found in the epidermis.



DIAGRAMMATIC DRAWING OF SKIN
AND HAIR

Study this as you read the text

Beneath the epidermis is the dermis, or true skin. Instead of horny cells it is made up of fibrous tissue. It is

the most important part of the skin. The dermis is supplied with blood vessels, nerves, lymph vessels, muscles, hairs, oil (sebaceous) glands, and sweat glands. The elasticity of the skin depends mainly on the elastic fibers of the true skin. If they are numerous and healthy, the skin is likely to be smooth and to have tone.

Underneath the dermis is the subcutaneous tissue, which serves as a kind of pad or cushion for the nerves and blood vessels, protecting them against outer pressure and injury.

115. Work of the skin. Many people think of the skin as something almost apart from the rest of the body, simply as a kind of casing. It is really an organ as much as the heart and lungs, and has several functions.

The first of these is its protective function. The horny layer of the epidermis offers protection against mechanical injury and against the absorption of dangerous substances, such as acids and caustics. It prevents the too rapid evaporation of water from the body. As long as the skin is intact it also protects against infection. Even the scratch of a pin may, by breaking the skin, lead to serious consequences. The presence of oil in the skin, supplied by the oil glands, makes the skin largely waterproof. The pigment, or coloring matter, of the epidermis screens out the harmful rays which might injure the deeper tissues. The coat of tan protects the skin against the sun's rays. The hair and the nails, which are really modifications or parts of the skin, also protect against extremes of temperature and against mechanical injury.

The skin is sensitive. It contains many tiny sense organs and nerve endings. The sensations of warmth, cold, pain, and pressure originate in the skin. They give us many valuable messages about the world with which we come in contact.

The skin helps to preserve the constant temperature of the body. When the body becomes overheated, an increased supply of blood is sent to the skin, the sweat glands are stimulated to pour out their secretions, and evaporation cools the skin. When the body is in danger of losing too much heat, the blood supply to the skin is lessened and the sweat glands cease to function noticeably.

Some excretion of wastes takes place through the skin. This was very much overemphasized by earlier writers on hygiene. The sebum, or oil manufactured by the oil glands, and the perspiration are largely secretions rather than excretions. The skin does throw off a small amount of poisonous wastes, but most of these are disposed of by the kidneys and intestines.

The skin breathes in a way similar to that of the lungs, but this activity is slight.

One of the peculiar properties of the skin is its power of renewing itself, or at least of forming a protective scar tissue. If some of it is lost by a scratch or burn, it has the power of growing and becoming as good as ever.

116. General good health affects the skin. It is important to remember that the skin is a part of the body, and anything that affects the general health of the body is likely to affect the health and appearance of the skin. The skin depends upon the blood for its nourishment. The skin feeds upon blood and only upon blood. It is therefore ignorance and ignorance alone which impels so many thousands of people each year to buy drug-store preparations known as "skin food."

The face may not be the mirror of the soul, but it is to a remarkable extent the mirror of the body. As Dr. Levin says, "Complexions are dials on which the body's health is recorded." Although there are occasionally external

conditions affecting the skin, the majority of its disorders result from unfavorable bodily conditions. Lack of sufficient hours of sleep, poor elimination of wastes, improper food, overindulgence in sweets, fried foods, or delicatessen foods, lack of rest and exercise, — all these bad habits, if persisted in, are certain eventually to injure the complexion and the skin. All athletes know how well the general health is reflected in the skin. The boxer is not physically fit until he is in the "pink of condition," — until the skin shows the glow of health.

117. Pimples and blackheads. One of the most perplexing problems of youth is to keep the face clear from pimples and blackheads. They are among the most common reasons for a poor complexion. The direct cause of this malady is the overworking of the fat glands of the skin. This is invariably accompanied by an excess of the top, or horny, layers of the skin. These horny cells of the skin multiply so fast that they prevent the natural drainage of oil from the fat cells. The blackhead shows on the skin as a black dot. This is either dirt or an accumulation of old dead cells. If blackheads are allowed to remain, they may become pimples. Often they become enlarged and inflamed. Possibly through scratching they may receive a secondary infection and pus may collect. Dirt or anything that closes the ducts of the fat cells may bring on an attack of blackheads, pimples, or an eruption called acne.

Milk is often used instead of water in cleansing the face. This is an injurious practice. Usually the skin is greasy in the case of acne, and milk simply increases this condition. Acne is likely to be accompanied by an infection, and milk on the skin is favorable to the growth of injurious bacteria. Irritation from powder rubbed into the skin is often a cause of acne.

It cannot be repeated too often that the face is best cleaned by water and soap. There are thousands of people who have the curious idea that soap and water injure the face. They use creams and lotions that make the face greasy, and they coat the skin with powder. This is really an unwise practice, for it does no good. Use soap and water. The highly advertised and expensive soaps are unnecessary. Generally there is nothing better than a good brand of Castile soap. Those suffering from acne should wash the face with cold water and soap several times a day. Cold water has a tonic effect on the skin. On retiring, warm water and soap may be used, followed by cold water. It should be said emphatically that there is nothing like soap and water for keeping the face clean.

Often acne is caused by eating improper food. Over-eating of sugars, starches, fried foods, gravies, and sauces is sometimes responsible. Most people do not drink enough water. It is essential that the bowels be kept open.

In conditions in which the skin is very dry owing to a lack of secretions from the fat glands, cold cream, almond oil, or olive oil should be used instead of water. Although many people think that their skins are overdry, this is a condition seldom encountered in health.

X rays and ultra-violet rays are now being used effectively for skin troubles. Advertisers are now recommending the use, by the layman, of the ultra-violet lamp. This is dangerous. It should never be used except by physicians trained in its use.

When trouble with the skin does not yield readily to simple hygienic treatment, a dermatologist, or skin specialist, should be consulted.

118. Freckles. When the pigment, or coloring matter, of the skin is deposited in tiny areas here and there in the

skin, these spots are called freckles. Freckles are the result of nature's efforts to screen out the powerful rays of the sun. People a generation ago used to wear broad-rimmed hats and veils and carry parasols to prevent or get rid of freckles, but today freckles and tan are generally understood to be indications of a healthful outdoor life.

119. Warts. Nearly everybody is familiar with the superstition that warts are caused by touching toads, but the real cause of warts is unknown. Some reliable authorities think it probable that warts, excepting the flat variety, are caused by germs, are contagious, and can be transmitted from one area of skin to another. They can be removed by the application of caustics, such as nitric acid and caustic potash, but the safer and better way is to consult a skin specialist. Warts that get sore and have collections of pus should always be referred to a physician.

120. Boils. When pus germs gain entrance to the skin through such natural openings as hair sacs, sweat glands, or oil sacs, boils often result. Nature responds promptly to the infection. Although the germs may be at first confined to a sac, they are apt to spread beyond its limits. To prevent the spread of the infection a wall of cells is built around the affected area. There is an engorgement of the blood vessels and a concentration of the serum and the white corpuscles. In the battle which takes place pus forms and pushes itself toward the surface. Finally the skin breaks, the pus drains off, and the opening fills up rapidly with healthy tissue and heals, leaving a scar.

The presence of a single boil is of little consequence, but if they continue to appear it is usually a sign of a run-down condition or other constitutional disorder, and

a physician should be consulted. A carbuncle is a number of closely grouped, deep boils. Carbuncles are likely to be very painful and sometimes are very serious.

It is a common error to think that boils and carbuncles should be lanced. Too often this happens, and the cutting of the hard rim permits the infection to spread. The main thing to remember in the treatment is the insistence upon asepsis and antisepsis. The boils and the skin around them should be washed with soap and water several times a day. After the washing, alcohol and water or boric-acid solutions should be dabbed on lightly. Antiseptic dressings should then be applied.

To prevent boils, keep the bowels open and keep the skin clean. Yeast helps somewhat, and inoculations may stimulate the defensive forces of the body.

121. The hair and what it does. A head of thick, glossy hair is one of the distinguishing marks of a good-looking person. When the hair begins to get gray or fall out, its worth is realized and people often resort to questionable methods to restore its natural color and to retain it. Some of the methods resorted to would never be considered if more were known about the hair and its work.

When a hair is examined under the microscope, it is found to have three layers. The first layer is composed of smooth, flat, transparent cells overlapping one another very much like shingles on a roof. This layer forms a protection for the inner part of the hair. The second layer, or cortex, has elongated cells and gives the hair its flexibility. The small openings in the cortex hold oil and give it sheen. Without this oil the hair would be dry and dull. The coloring matter in this layer shows through, giving the hair its characteristic color. The third, or

central, layer is the narrow medulla, or pith, which has two rows of cells placed side by side lengthwise of the shaft. Contrary to common belief, this medulla is not hollow.

At its lower end each shaft of hair swells into a bulb, or bowl, which fits over the papilla, or projection in one



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BEAUTIFUL HAIR

The result of good health and care

of the layers of skin. It is through the papilla that the hair gets its blood supply and nourishment. In connection with each hair follicle, or sheath into which the hair fits, are tiny muscles that tend to raise the hair erect. The tendency is very marked in the case of the cat who "gets her back up." These muscles, by contracting, also cause goose flesh.

Every hair, if permitted a normal growth, attains its full length,

drops out, and is replaced. In the life of a hair there are alternate periods of rest and growth.

The hair today is less useful in a protective way than it was in primitive times. Then it protected the head against cold, dampness, and bumps. Today clothes and hats provide insulation against extreme temperatures and protect the head, but the need of healthy hair today from a decorative point of view is as great as ever.

122. General good health promotes the health and beauty of the hair. Just as a bud on a tree depends on the limb or trunk of the tree for its healthful development, so the hair depends on the body. The hair depends on the circulation for its nourishment, and therefore anything that affects either the quality or the quantity of the blood affects the hair. Health is one of the essentials for good, nourishing blood. The practice of the various rules of health, like eating nourishing food, getting plenty of sleep, wholesome recreation, etc., is conducive to the healthful development of the hair. No treatment of the hair is likely to be effective unless there is first general bodily health.

123. Care of the scalp. The scalp is probably dirtier than any other part of the skin surface. It not only retains the dust and soot from the atmosphere, but it also conceals and holds the secretions from the sweat and oil glands and the scales from the skin that are thrown off in abundance, particularly when there is infection present. In spite of these facts many people, perhaps most people, think that the hair should be washed as little as possible. They may clean the teeth three times a day and take a daily bath, and yet wash their hair only once in two or three months. As a rule, the scalp should be washed once or twice a week. Despite old-time beliefs, washing does not hurt the hair. Under proper conditions washing removes dirt, scales, dust, and grease, and decreases the liability to infection. The ideal in cleanliness of the scalp is to maintain the same cleanliness as on other surfaces of the body.

Neutral soaps of well-established brands are fully as good as the more expensive and medicated soaps for shampoo purposes. A good Castile soap in liquid form

is best and most convenient. The following rules summarize the most important points on shampooing:

Wet the scalp thoroughly.

Rub on soap until a thick lather is formed.

Knead this into the scalp with the tips of the fingers.

It is not necessary to leave soap in the hair for ten or fifteen minutes.

Rinse thoroughly.

Rinse several times alternately with hot and with lukewarm water until every bit of soap is removed.

The last rinsing should be with cold water, to stimulate the circulation of blood in the scalp and to close the pores.

Dry the hair at once with towels. Combing the hair with the fingers and shaking the hair while drying it is a good practice.

To prevent extreme drying of the scalp, the white of an egg may be rubbed into the hair or added to the shampoo water. This treatment also increases the gloss. Unusual dryness and hardness of the scalp may be overcome by rubbing into the hair olive, almond, or coconut oil.

Unusually greasy hair may be rubbed with cologne water and immediately dried.

It is a good practice to dry the hair in the sun.

Each member of the family should use only his own comb and brush.

Avoid patronizing beauty parlors or barber shops where brushes and combs are not sterilized.

Combs and brushes may be sterilized at home by boiling them or soaking them in a solution containing one teaspoonful of formalin to a pint of water.

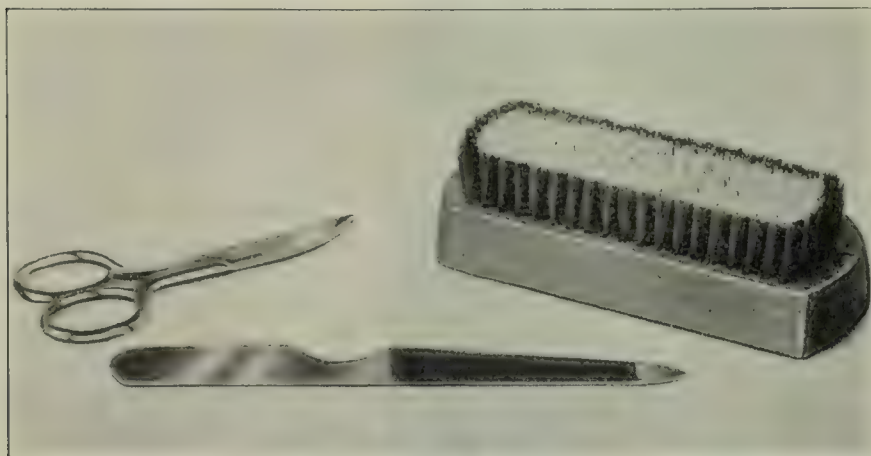
Use combs with smooth, blunt teeth.

Metal combs and fine-toothed combs should not be used.

124. Gray hair. After the hair has turned gray there is no treatment that will restore it to its natural color. Dyeing the hair is not recommended, since it is often

injurious to the scalp. Grayness of the hair may be due to some illness or to a diseased condition of the scalp, or it may be simply the accompaniment of years. Often it seems to be hereditary.

Something can be done to prevent premature grayness by caring for the scalp and the general health. When the first gray hair appears, the condition of the body should be looked after at once. At such a time it is wise



THREE FRIENDS WORTH HAVING

to consult a hair specialist. It should be remembered that beauty parlors are usually run by people who have had little training in science and may have unsanitary habits.

125. Baldness. The falling out of the hair may be prevented to a considerable extent by the proper care of the scalp and by the maintenance of the general health. Like grayness, it often seems to be hereditary. Dandruff, grayness, and baldness may be due, to some extent, to an infection of the scalp. If the ordinary means of caring for the general health and the scalp and hair do not suffice, it is always best to consult one's family physician or a specialist.

126. **Care of the hands and nails.** There are at least two very good reasons for the proper care of the hands. In the first place, properly groomed hands are marks of refinement and are necessary for advancement in many professions. Any boy or girl, man or woman, who habitually has dirty hands and unkempt finger nails will find such conditions a serious handicap in business. Many a person



AN ATTRACTIVE HAND

Can you tell why?

has lost the chance to secure a position or to be promoted, because of dirty finger nails or grimy hands.

Secondly, the hands should be kept in a hygienic condition because they are likely to be contaminated and convey disease, especially in eating. They should be washed carefully after each visit to the toilet and also before eating.

The hands are quite tough and will stand a good deal of washing. A hand brush may be used effectively. It should be neither too soft nor too hard, and ought to be sunned frequently in the open air.

The nails, which, like the hair, are outgrowths of the skin, need especial care, since their point of contact with the skin is delicate. The skin tends to hang to the nail and then become stretched and torn. Serious infection may result. A blunt orange-wood stick may be used to

push the skin back around the base of the nail. A good time to do this is after the bath. If the skin in contact with the nail gets too dry, it may be softened by allowing cold cream to remain on it all night. If hangnails form, they should always be carefully cut rather than pulled away. It is better to file than to cut nails. Long, pointed nails should be avoided, since they tend to break. The filing of the nail should follow the natural curve of the finger tip. A narrow margin of white should extend beyond the red bed of the nail.



A SECTION OF
THE END OF A
FINGER, SHOW-
ING THE NAIL

127. Chapping of hands in winter. Hands which are chapped and rough are not easily kept clean. Chapping leads to cracks in the skin, through which infection may enter. Therefore it is well to prevent chapping. Skin washed with warm water and soap often becomes dried out and rather rough. In winter it is well to rinse the hands in cold water free from soap and to dry them thoroughly. At the first sign of chapping apply glycerine as a hand lotion.

Try This

Write a brief important statement about each of the following. Think hard. Do your best.

1. The desire to be good-looking.
2. Beauty and the condition of the face.
3. The first layer of the skin and its function.
4. The second layer of the skin and its function.
5. The third layer of the skin and its function.
6. Three things that the skin does.
7. Why the general health affects the skin.

8. What a blackhead is.
9. The prevention of blackheads.
10. The cure of blackheads.
11. Washing the face in milk to insure a good complexion.
12. The treatment of warts.
13. What causes a boil.
14. The treatment of boils.
15. The first layer of the hair.
16. The second layer of the hair.
17. The third layer of the hair.
18. The use of the hair.
19. The relation of the hair to general health.
20. Keeping the hair clean.
21. A good shampoo.
22. Gray hair.
23. How to manicure the nails.
24. The prevention of hangnails.

Interesting Things to Do

1. Examine a hair under the microscope. What do you see?
2. Examine a bit of skin under the microscope. What do you see?
3. Show the class a well-manicured set of finger nails.
4. Look through the files of *Hygeia* and report to the class on quackery in connection with the hair and skin.
5. Make out a list of the habits that are necessary in order to keep the face healthy. How many of them have you formed? How many of them will you form this year? Consider also the habits necessary for the care of the hair and the nails.

CHAPTER XI

DRESS FOR HEALTH, COMFORT, BEAUTY, AND ECONOMY

128. Our standards of dress. It is a fact accepted by intelligent people that our dress should make for health, comfort, good looks, and economy. In actual life we find that these standards do not have as much influence as we might imagine. Notice, for example, the young lady who wears very high-heeled shoes. To keep her balance she must assume an ugly posture. Wearing such shoes will not tend to make her healthy, comfortable, or beautiful. Observe also how we buy new coats and hats not because ours are worn out but because they are not in style. Nobody, of course, wants to look odd as compared with other people. If we do not adopt extreme styles of dress, we shall find that it will be possible for us to wear our clothes longer and still be not very different from other people.

Although these standards of dress are frequently violated today, our dress is much more comfortable than it was fifty or one hundred years ago. Present-day fashions demand comfort except with a few things, such as stiff collars for men and formal dress in hot weather.

129. Clothing and the temperature of the body. To keep in good health it is necessary that the body should keep its normal temperature of 98.6° F. Wearing the right kind of clothing as a means of regulating temperature is therefore of great significance for health.

For protection, clothing should be adapted to seasonal changes in air conditions and to convenient alternation between outdoors and indoors. The weight should be always just sufficient for perfect comfort. If we could be comfortable with less clothing, we are too heavily dressed for health.

Indoor clothing should be suited to indoor temperatures. Since our living rooms in winter are kept at summer heat, clothing should be of light weight, porous, and washable, in winter as in summer. Adaptation to outside weather is made by the addition of heavy wraps and hand and foot coverings. To sit in a warm room with heavy clothing on and to go outdoors insufficiently protected against cold are equally injurious.

Wool is the warmest fabric, because it is the poorest conductor of heat and therefore keeps the heat of the body from being conducted away to the cold air outside. Cotton comes next, then rayon, silk, and linen. The last three are cool fabrics because they are good conductors of heat. Woolen underwear and stockings are the appropriate wear for rooms that are unevenly or insufficiently heated, or for severe outside cold.

The vigor of the wearer is an important factor in determining the weight and material of clothing. Some persons in vigorous health need a great deal less clothing, either indoors or outdoors, than others with less resistance. It is usually true that boys and girls who need more clothing than their companions in order to be comfortable indoors have poor circulation. They will find, doubtless, that they are also exercising less than the others, and that they do not react with a healthy glow after cold shower baths. Study your own needs and dress accordingly.



LADIES' DRESS OF BYGONE DAYS

Compare these styles with those of today as to beauty, comfort, and health

Clothing must be porous. Summer or winter, indoors or out, the skin perspires, and this moisture must be allowed to evaporate into the air. This evaporation, as you have probably noticed, is the basis of the heat regulation so essential to the health of the body.

Cleanliness is therefore a health essential as well as an essential of good taste. Clean clothing is more porous, and allows freer circulation of air and moisture.

Uniformity of clothing is a most important essential. Clothing should cover the body evenly. If one part is warm and another uncovered or thinly covered, the circulation of the blood is thrown out of balance, and a surprising number of uncomfortable effects can follow. Most harmful is the wearing of underwear that leaves part of the skin unprotected while other parts are adequately clothed. The wearing of furs around the neck is likewise unhygienic, since it creates unevenness of body temperature.

For winter outdoor wear coats, gloves, overshoes, and stockings should be adequate for perfect comfort. Especially to be avoided is the chilling of some one part, as when one goes without gloves or wears chiffon stockings while the rest of the body is adequately clothed.

Hygienic clothing permits freedom of movement in all parts of the body. Tight bands, belts, and garters are all injurious. Anything sufficiently tight to hold a garment in place constricts the blood vessels and nerves.

The fashion of knickers and sweaters for girls as well as boys, for outdoor sports and hikes, is a most healthful one. Even a short skirt does not give the freedom of knickers.

The same principles which governed Admiral Byrd's careful planning of clothing for the members of his arctic



GENTLEMEN'S DRESS OF BYGONE DAYS

Is it as practical and healthful as the dress of today?

expedition apply to winter clothing anywhere. The outer garment is of reindeer skin, which is nonporous, keeping the wind out and the warmth of the body in. Next inside they wear an inner suit of fawn skin, — very loose and soft. This gives a layer of warm air between the outer and inner garments. The fur, being inside, makes a thick, soft blanket which holds the warm air next the body and



ADMIRAL BYRD

Dressed for his adventures in the
Antarctic

yet allows evaporation to take place.

While we do not need to wear reindeer skin in winter, the essentials of outdoor clothing for cold weather are the same. It should be loose and warm, and the inner layers should be porous.

The color of clothing affects temperature.

White is the universally suitable summer color, because white is the result of the reflection of

all the rays of light ; black is the warmest color, because it is the result of the absorption of all the rays. An easy demonstration of this difference in the heat-absorbing powers of colors may be given by laying on a piece of ice, outdoors in the sun, pieces of cloth of the same kind but of different colors. White, black, red, and blue would be an interesting selection. Note that the ice melts most quickly under the black cloth and most slowly under the white. If the red and blue are pure colors, the ice under the red will melt more rapidly than that under the blue.

130. Beauty in clothing. Clothing as a means of adornment is a most important consideration. One's best points of coloring and build should be taken into consideration in planning clothing, and these lines and colors accentuated. It is also important to avoid calling attention to extreme characteristics. The very tall girl or boy will not wear patterns with long, unbroken, up-and-down lines, nor will the fat ones use round-and-round lines. The colors in the costume should repeat the colors in the complexion, hair, or eyes. A touch of color in the dress brings out the corresponding tint in hair or skin or eyes. A color chart made with the help of the art teacher will give you a surprisingly wide range of coloring to choose from. A little of this study of the real art of color selection will leave no desire to cover nature's appropriate and subtle blendings of hue and light and shade with inartistic rouge and lip stick. Extremes in dress should always be avoided.

131. Economy in clothing. One great secret of being well dressed on a limited budget is the choice of a basal color and one or two accessory colors for decoration. If this color plan is adhered to year after year, things always go together, whether bought the same season or not. The colors are those that repeat tones of the complexion chart.

132. Interesting tests of fabrics. Boys as well as girls like to know that they are buying a suit that will not wear shiny or sag after a few weeks of wear. A few experimental tests of fabrics, which will enable one to judge the value of a fabric, are interesting to perform, may prove useful, and can be made at home.

To distinguish cotton from linen, put a small drop of ink on each. Note that the ink spot becomes rapidly larger on the linen, while on the cotton cloth it spreads much more slowly.

To distinguish wool, burn a small piece ; the characteristic odor cannot be mistaken.

To tell whether a silk or a wool fabric is mixed with cotton, boil the sample for ten minutes in lye (a 10 per cent solution of sodium hydroxide from the druggist will do, or any strong household alkali, such as washing soda).



A TEST FOR WOOL

The silk or wool fibers will be dissolved in the boiling alkali, and only cotton will be left. If the fabric all dissolves away, it was pure silk or pure wool, or both.

Often a mineral filling, or sizing, is used to increase the body, or weight, of fabrics, particularly of silk. To test the presence of this filling, burn a piece over a flame. If sufficient ash is formed to keep the shape of the piece of

fabric, it is heavily filled and would not wear well. The amount of filling may be determined by weighing a piece of cloth, boiling it in several changes of water for half an hour, drying it, and weighing it again. The amount of weight lost indicates the amount of filling that was present.

True or False?

Read each of the following statements with care. Is it true or false? Why or why not? Support your reasons by facts.

1. Dress should be comfortable.
2. If dress is comfortable, it is likely to be healthful.
3. In buying clothes everybody thinks of comfort first.
4. If clothing is cheap in price, it will not be beautiful or healthful.
5. Variations in bodily temperature are not important.
6. Men's clothing is much more comfortable than that of women.
7. We need to choose our clothes wisely so as to keep cool in summer and warm in winter.
8. Underclothing ought to be much heavier in winter than in summer.
9. It is a good plan to wear sweaters in the schoolroom.
10. It is expensive to adopt extreme styles.
11. A garment of cotton weighing just as much as a similar garment of wool is just as warm.
12. Linen is cooler than cotton.
13. Porous cloth is warmer than nonporous.
14. Different people require different weights of garments to keep warm.
15. Tight garters are not injurious to health.
16. White clothing is cooler in summer than dark clothing.
17. Dress should be planned so that its color will harmonize with the color of a person's hair, eyes, and skin.

Interesting Things to Do

1. Perform all the tests described in this chapter.
2. Make a scrapbook of pictures of healthful dress.
3. Plan for a style show at school. Compare our own simple and healthful clothing with fashions of other days. Include the present costumes of other countries. Bring in history, art, and hygiene.

CHAPTER XII

MENTAL HEALTH AND HOW TO GET IT

133. The meaning of mental health. When the word "health" is mentioned, we are likely to think at once of things that concern the mere physical body. Probably this word suggests to you at once good lungs, a strong heart, a keen appetite for food, gain in weight, freedom from illness, etc. Every citizen should aim to have a body that is as nearly perfect and as beautiful as possible; but if we could satisfy such an ambition, it would not necessarily mean that we should be happy. Happiness results not simply from good physical health but from being able to meet with fair success the problems that one has to face. Let us suppose that you have tried to do something and failed, and that you fail every day until you do not expect to be successful. You begin to feel discouraged and wonder whether it is worth while to try. At last you may give up in despair. Under such circumstances, even if you do have a good heart, a good digestion, and excellent lungs, you are mentally sick.

Being in good mental health means that one is fairly successful in getting along with others and in doing things that he sets out to do. He feels a keen interest in life. It seems satisfying and worth while. He is a happy individual.

134. Mental health must be earned. Good mental health does not drop from the skies. It is not the special possession of the rich or the poor, or of a particular race or

class. Every human being has difficulties in life. Everybody must learn how to meet these in the proper way if they are to be mentally healthy. For example, a failure may be turned into a success because one learns from it.

One scientist in a laboratory tried hundreds of experiments over a period of seven years before he was successful. Each experiment taught him something. He improved his methods. He discovered some of the reasons for his failures. At last he won success. He had not allowed himself to become sour over his failures. He had made each one a stepping-stone to success. To resolve to profit from our errors is an attitude that will be serviceable to us in learning to be mentally healthy. It is not easy to learn, but it pays

a high rate of interest to those who master this lesson.

135. Study your strong and your weak points. In addition to studying our lessons in school we should study ourselves diligently to find out what we can do best. One reason why we fail and often suffer keenly is because we attempt that which for us may be impossible. Some of



LET US GO FOR A RIDE!

Horseback riding is an exhilarating sport

our friends or acquaintances make the football team or get on the honor roll. We fancy we can do the same thing, but we meet with defeat. It may be worth while for us to keep on trying, or it may be much better for us to try something else. If we cannot sing, or make the team, or



A PHYSICAL EXAMINATION

The doctor helps the boy scouts in camp to be healthy and happy

get on the honor roll, we may improve our school work, paint pictures, develop skill in writing, or make a garden.

126. Keep yourself in good physical health. One's mental health depends to a very great extent on one's physical health. The boy or girl who gets plenty of sleep, eats nutritious food, gets plenty of recreation in the open air, and practises all the rules of healthful living is more likely to start the day's work with vigor and interest. Success is more likely to result. Buoyancy and a feeling of confidence naturally follow a good physical condition.

137. Seek wholesome recreation. It is impossible to keep mentally fit if we apply ourselves constantly to our work. Everybody needs to get some recreation every day. It should be so fascinating that study, school, and work may be forgotten. As far as possible this recreation should be taken out of doors. Outdoor games, hiking, mountain-climbing, rowing, swimming, bird study, and photography are all delightful forms of recreation.

138. Avoid excusing yourself for your failures. We naturally try to avoid pain. When we are not successful, it eases our mind somewhat to excuse ourselves. If we do not win the game, it is so easy to say: "I have had less experience in playing. I am younger. I am not feeling well." At times these excuses may be real reasons, but often they are only means whereby we make ourselves more comfortable. Let us examine the excuses that we are tempted to make and learn to face the facts, even if they are disagreeable.

139. Avoid blaming people or circumstances for your failures. This is another bad habit. If somebody beats us in a game, we are likely to say to ourselves, "My opponent cheated," or "My croquet ball was chipped." One of these reasons may be the correct one, but in most cases our thought simply tries to make us more comfortable. Such thinking does not help us to play the game better next time. If, instead of spending time and energy in faultfinding, we set ourselves the aim of finding out our mistakes and correcting them, we shall improve in our power to play the game. It is a good habit to face the facts courageously, with determination to do better next time.

140. Refuse to bear grudges against anybody. Everybody is sensitive to praise and blame. We are naturally

hurt by unpleasant remarks other people make about us or by unkind things that they do. We tend to feel bitter toward them and to carry this bitterness. If this becomes a habit, we suffer as a result. We are constantly imagining insults and slights, and sometimes we find it hard to get along with others. Peace of mind is denied us.



GARDENING IS A WHOLESOME AND PROFITABLE HOBBY

To overcome this bad habit it is well to remember that many of the things that are said are not intended to cut us at all; they are said thoughtlessly; and even when people intend to injure us, we can often overcome our bitter feeling by treating them as if nothing unpleasant had ever happened. If we can do that, we shall develop a stronger character.

141. Carry your dreams into action. It's great fun to daydream. We can readily change our world as if by magic. We can become wealthy, powerful, handsome,

clever, and talented in a moment. Daydreams charm and rest us. Moderate daydreaming may be restful and helpful, but daydreaming may become a bad habit. We should not be content even with fascinating daydreams, but should try to make them work. Try to guide your dreams in a practical way. It is a good thing, perhaps, to dream about yourself as a great musician, but skill in music comes through long-continued, strenuous practice. Do not let your dreams take the place of rigorous self-discipline. Spend less time in dreaming about what you would like to be, and more time in trying to become what you wish.

142. Conquer worry. Fear is the cause of worrying. We never worry when we feel that everything is coming out all right. Worrying is a bad habit. It makes us very unhappy, and it interferes with our work. There are several different things that we can do if we tend to worry. First, we may remember that the thing which we fear seldom happens. Again, we may turn our thought toward something else; if we worry about our lessons, we may turn our attention to some good book or other form of recreation. But better than either of these remedies is action, if action will help. If there is anything that can and ought to be done, then we should do it; if nothing can be done to meet the situation, then we should try to forget it. If we are preparing for an examination, it will do no good to worry. We should do our best and then try to be satisfied. The person who cannot learn to be satisfied with his best is likely to have a nervous breakdown.

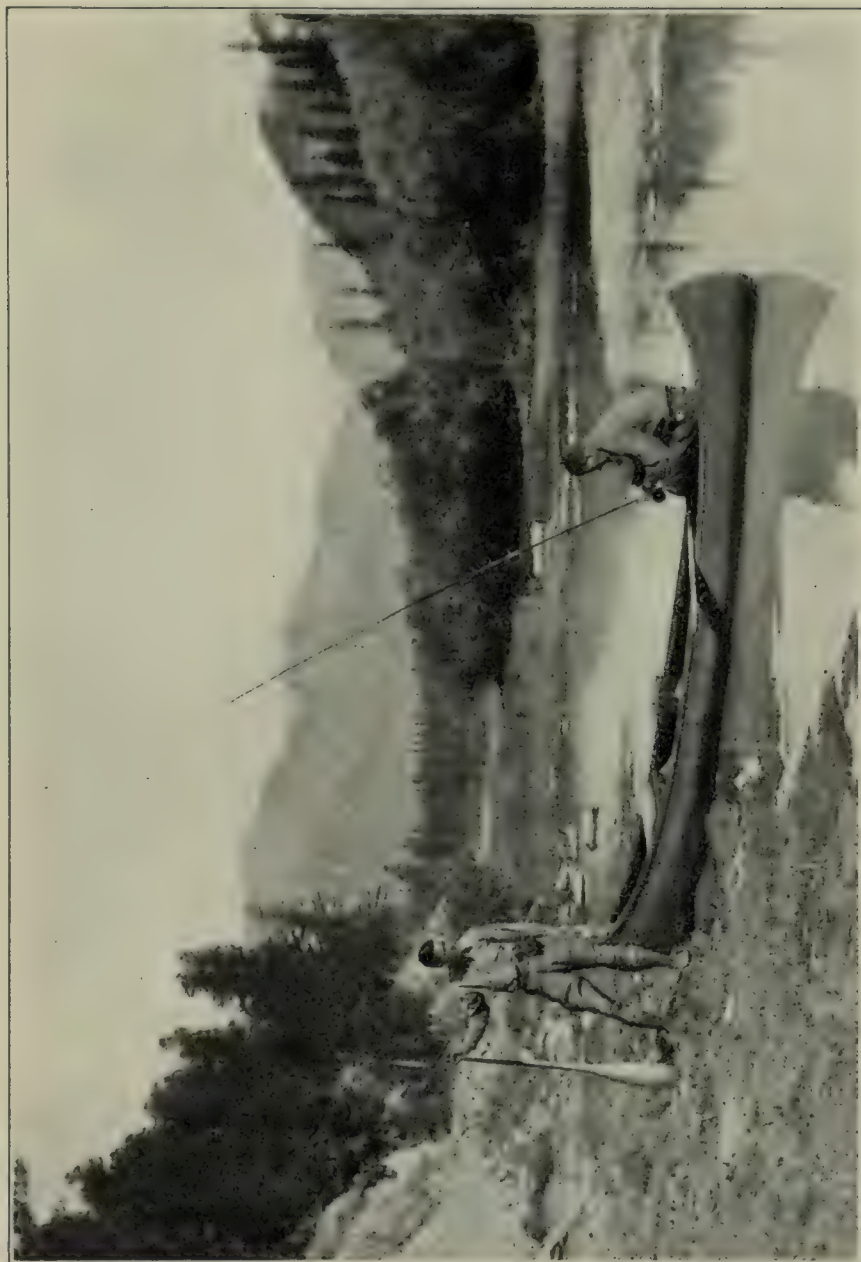
143. Do one thing at a time. It is a bad habit to allow your mind to wander when you are trying to do something. It often leaves one with a sense of things half done. No matter how many things are pressing in upon

you to be done now, choose the most important and bend all your energies toward that. We can get concentration of attention only by practising it. Before starting any work it is a good plan to arrange everything so as to make for concentration. For example, if you wish to study your arithmetic for the next half hour, it would be a good plan to clear your desk of all papers and books that are unnecessary in getting your arithmetic lesson. Remove all distractions, so far as possible. Then launch yourself into your work with the determination to stick to it until you succeed. Sometimes this takes courage, but if you persist, you will have the satisfaction of having succeeded. Getting the habit of complete concentration on your task will make you happier and more successful.

144. Seek inspiring influences. To keep healthy mentally it is well worth while to seek the companionship of beautiful music, inspiring books, and wholesome friends. By learning to love the best in music and art we gain an interest that helps to make life sweeter and better.

145. Learn to rely on yourself. Many boys and girls get into the habit of depending upon their fathers, mothers, and teachers more than they should. While a certain amount of this may be necessary in early life, self-reliance should be steadily gained if one is to meet the world with success. The way to become self-reliant is to *practise* self-reliance. Plan projects and carry them through yourself, seeking as little help as possible.

146. Mental health comes through practice. Good habits determine good mental health. As we learn to conquer worry, to be honest with ourselves, to meet every problem that comes up honestly, to do our best and be content with our best, to carry out our dreams into action, to be self-reliant, etc., our mental health will improve. Mental



ROUGHING IT IN THE WILDS DEVELOPS SELF-RELIANCE
Why? Tell about other ways of developing this trait of character

health, like physical health, does not ordinarily come without effort. It must be earned by patience, perseverance, and practice.

Try This

After reading each of the following statements write a short sentence that will tell the best reason why you think each is true. Let the members of the class compare sentences. Which is the best?

1. One may be in good physical health and still not be healthy.
2. Mental health is as necessary as physical health.
3. The test of mental health is happy, successful living.
4. Mental health depends on our forming the right kind of habits.
5. To be successful one should learn to know one's self.
6. Keeping one's self physically fit is a step toward mental health.
7. Excusing one's self for failure is a bad habit.
8. Instead of excusing ourselves for failure, we should look for the causes and try to remedy them.
9. Daydreaming may be a vicious habit.
10. Self-reliance is a good mental habit.

Interesting Things to Do

1. In your reading of the lives of great men and women, look for examples of good mental health.
2. Write a list of good mental habits that you have acquired. Explain why they are desirable habits.

CHAPTER XIII

SCIENCE CONDEMNS DRUG HABITS

147. **In the grip of habits.** We are what we are because of the habits that we form. This relates to everything that we do. Neatness in dress, accuracy in mathematics, good posture, telling the truth, and self-reliance, all become matters of habit. After we have practised them for a long time we dress neatly, stand tall, and tell the truth without thinking. Finally we are quite firmly in the grip of habits which we can change only with the greatest amount of effort. This is true of all habits, whether they are good or bad. One may get in the grip of a bad habit as well as of a good one. Thus we see how important it is to have good habits as our friends. Every good habit is like money in the bank. It is a real help in time of need. Good habits help us to be happy and efficient men and women, — to be successful in life. Bad habits enslave us.

148. **Alcohol habits in history.** Centuries ago, at the very dawn of history, people were using drugs. Chief among these were alcoholic drinks. The early Egyptians left pictures which show men making wine from grapes, and beer from barley. They also show bands of young people leaving the drink shops at night, carousing and breaking into the houses of peaceable citizens. Even at that early day the danger from alcoholic habits was recognized. Writing tablets found among the Egyptian ruins give warning against drunkenness. "Do not waste your time in the beer

house," one father wrote to his son. "How easily you might fall and break your limbs where no one would be near to help you." The Greeks and Romans have left us in their literature vivid accounts of revelries and drunkenness.

149. General recognition of drink evils. Even before the dawn of science the evils of drink were recognized, and measures were taken to correct them by law and punishment. As early as 1129 B.C. drinking companies were threatened with death by a Chinese ruler. In India, in 900 B.C., a law was passed punishing merchants and sailors for drinking. They were to be branded with a red-hot iron, and it was commanded that nobody associate with them. The laws of ancient Athens condemned to death any member of the Areopagus who became intoxicated. In their sacred book, the Koran, the Mohammedans forbid the drinking of alcohol. Among the Mohammedans alcohol carries the name of "mother of vices." It is not considered as a legitimate article of commerce by them, since legally they have no right to produce, consume, buy, sell, or transport alcoholic liquors. Laws against drunkenness have been passed generally among civilized peoples. Most of the great nations have attempted to control drinking by some kind of legislation. The most striking attempt at control occurred during the World War. It was then recognized by the great powers that one way to help win the war was to prevent drinking. As a result strict laws were passed and enforced. In many of the provinces of Canada laws were passed forbidding the manufacture and sale of intoxicating liquors.

In the following pages the general attitude of science toward alcohol and other drugs will be briefly presented.

150. Alcohol is a drug. Some of the advocates of the use of alcohol have defended their stand by attempting to show that alcohol is a food. Even if this were admitted on its face value, it would be an absurd defence. It is true that some scientists, like Atwater, report that alcohol appeared to be burned in the body like fuel foods, and in that sense it might technically be called a food. But these same scientists gave explicit warning as to the danger of alcohol, and that the total effect was to be considered. Scientists are agreed that the food value of fruits and grains used in the manufacture of alcohol is largely destroyed in the process of manufacturing, because their starch and sugar are largely changed to alcohol. Then, too, good foods, like oatmeal, milk, and oranges, not only supply energy but help to build muscle and bone. Alcohol does not build any body tissue or repair waste. We have absolutely no evidence to show that alcohol can supply anything but energy; and while it may do this, it has a poisonous effect on the body. Medical and health authorities also, with few exceptions, agree in the belief that alcohol is a drug and is in the same class with opium and morphine.

151. Alcohol as medicine being dropped. There was a time within the memory of those now living when alcohol was thought to be very valuable as a medicine. It was used liberally by physicians for colds, snake bites, tuberculosis, typhoid fever, and other maladies. But the practice of medicine has changed so that its use has been greatly reduced. Some physicians never prescribe it. Its use in hospitals, even before prohibition, was limited. Physicians have found safer and better remedies. From time to time bodies of physicians have gone on record as maintaining that the use of alcohol in medicine as a

tonic, a stimulant, or for food has little or no scientific value and should be discouraged.

152. Alcohol a foe of athletics. The evil effects of alcohol on athletic games and contests are so well known that its use, at least during training, has been forbidden by coaches and athletic associations. When a star athlete begins to drink, his days of superiority are numbered.

Amos Alonzo Stagg, the famous coach, once said, "As a coach I do not believe, and none of the coaches that train men believe, in the use of alcoholic drinks." When the Olympic team which he helped to train went across to Paris to play, they even took their own water with them, to which they were accustomed. There wasn't any question in the mind of this coach that the use of liquors in training is a detriment.

153. Drink habit a handicap to business. Even those who use alcohol prefer to hire, in their business, people who are not addicted to its use. Among the advertisements frequently appearing in the daily papers during saloon days were those calling for a barkeeper. Not infrequently, among the qualifications named as requisite for the position, it was stipulated that the applicant must not be a drinker. Even the saloon-keeper did not care to have a drinking man handle his money and look after his business. This attitude on the part of the saloon-keeper was shared by other business men. Railroads, banks, department stores, and many other business organizations would not hire men who drank, particularly those who drank during their hours of employment. Today the habitual drinker stands little chance to be successful.

154. Alcohol a deceiver and cause of many accidents. Lord D'Abernon, of the British Medical Research Council, says, "Alcohol gives the drinker a false impression of having

done his work with unusual speed and success, whereas impartial examination shows that both accuracy and regularity are not up to the standard." In other words, alcohol is a deceiver. Alcoholic liquors tend to decrease the mental and physical efficiency of the worker, but in most cases he is not conscious of these shortcomings. After drinking he thinks he is doing more work and doing it better. This false notion of self-control may be very dangerous at times. Vision tends to be impaired, the field of attention narrowed, and sleepiness produced by drink. Of all this the drinker may be more or less unconscious at a time when, in the interests of his own safety and the safety of others, he needs to make right decisions and make them quickly. In this dangerous machine age, when we need to have our wits about us more than ever, a drug which tends to deceive us is not the best kind of friend to have. It is not surprising, therefore, to find the large percentage of automobile accidents due to drinking. Who would care to ride in a taxicab with a driver who was under the influence of liquor?

155. Even moderate drinking affects muscular control. The drinker who staggers and makes silly remarks has evidently lost his self-control. Both mind and muscle have lost their efficiency. Science shows that alcohol is readily absorbed into the blood, by which it is carried to the various cells of the body. It directly affects the higher centres of the nervous system, weakening judgment and self-control. Lack of control from this cause is responsible for many accidents and crimes.

It should be made clear that even moderate drinking impairs muscular control. A very interesting experiment showing how the drinking of alcoholic liquors affects con-

trol was carried out by threading needles, — an operation which, like many other kinds of work, requires quickness and precision. The experimenter put 200 needles in a cushion and then placed many threads, cut about eight inches long, on a board where he could easily pick up the single threads. An accurate record was kept of how many were threaded for each period of five minutes. The graph on the opposite page shows what happened. The white columns show the amount of work done each day when he took no alcohol; the shaded columns show the work done on days when he took 25 cubic centimeters of alcohol. Notice how he gained in speed. The first group of the white columns shows how he increased the number of needles that he could thread in twenty minutes. The first day he threaded only 103; the second day, 150; the third day, 165. Finally he was able to thread 190. Three days later he began to take alcohol. There was a slight increase at first, and then a regular decrease until, on the twenty-fourth day, he threaded only 164 needles. During the last of these alcohol days he found his hand trembling and his eyes growing tired more easily. Notice how his skill returned when he stopped drinking alcohol.

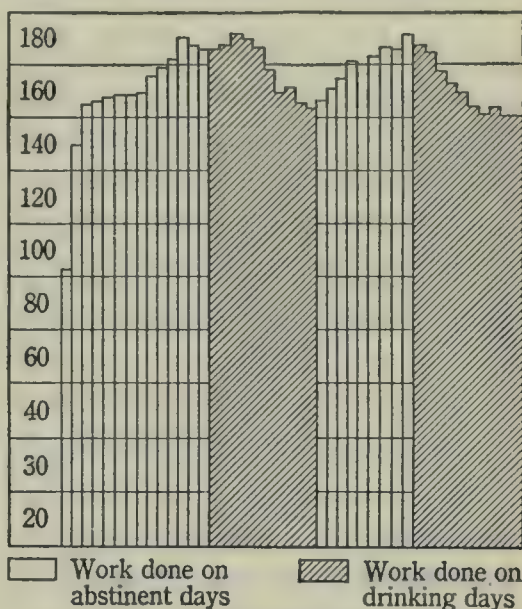
There are many experiments showing that alcohol not only reduces the amount, but also the quality, of work. In almost every case the worker thinks that he can do more, but actual tests show that he tires more quickly or works less accurately.

Is it at all strange that none of us would care to have a dentist fill our teeth or a surgeon perform a delicate operation on us if he were known to use alcohol? The pilot on a boat and the engineer on a locomotive are not allowed to drink alcohol. For them and for others in their keeping alcohol spells danger or perhaps even death.

156. Alcohol shortens life. Some of the best information that we have about the effect of alcohol on the length of human life has come from the insurance companies. A number of years ago, forty-three important life-insurance companies undertook a study of their policyholders. In this study, among other things, the death rate among users of alcohol and those engaged in the liquor trade was examined. Only those who were in good physical condition when insured were included.

The study showed that generally the drinkers died earlier than the average insured man. Those who had occasionally "gone on a spree" in the period before insuring had a death rate 50 per cent higher than the average. That means that, where we should

have expected 100 to die, there were 150 deaths. Among those who, when they were insured, said that they drank every day two glasses of beer, or a glass of whisky, or some other liquor containing alcohol, the death rate was 118 against an average of 100. Among those who drank every day more than this amount the death rate was almost double what it should have been. They lost 186 when they should have lost only 100. The cause of death was varied,



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DRINKING ALCOHOL LESSENS SKILL

The columns in white show the number of needles threaded when no alcohol was taken. The shaded columns indicate needles threaded on alcohol days

but there was an abnormal amount of Bright's disease, pneumonia, suicide, and cirrhosis of the liver. In the class of moderate drinkers there were five times as many cases of cirrhosis of the liver as among average insured men.

The insurance records showed that the men engaged in making and selling alcoholic liquors were in a business carrying a special health risk. Among brewery foremen, for example, the death rate was higher than among men engaged in dangerous occupations, — for example, electric linemen and city firemen. "The general trend is the same in all companies," says Dr. E. L. Fisk, "and shows that Old Mortality and John Barleycorn are exceedingly good cronies. Wherever you find alcohol you find the following formula at work: More alcohol, higher death rate."

157. Alcohol increases danger from cold. Many people believe that alcohol produces warmth and consequently protects against cold and exposure. This is an old notion that we must let go. Long ago experimenters proved that the use of alcohol leads to loss of bodily heat and increases danger from the cold. What happens is this: Alcohol paralyzes the nerves which control the size of the blood vessels near the surface of the body. This permits an extra amount of blood to flow to the surface of the body. The little sense organs in the skin report this to the brain and a feeling of warmth is recorded. But when the blood is brought to the surface in this way it is chilled by the colder air of the atmosphere. This leads the body to lose heat just at the time when it is most needed. Soon the drinker feels colder than before, if he is not so overcome by cold as to be unconscious. This is the reason why the drinker, when exposed to the cold, is more likely to freeze. Great arctic explorers like Nansen find no use for alcohol

as a protection against cold. Anyone who wishes protection would do well to spend his money for warm clothing, hot food, and hot drinks rather than to use alcohol.

158. The grip of the alcohol habit. The peculiar thing about alcohol is its tendency to produce a desire for increasing amounts. It is not a true food, and there is no natural need for it, but in the case of very many who begin to drink alcohol the desire for it becomes so strong that it may be difficult if not impossible for them to shake themselves free from its clutches. This is not true of milk or of any real food. Although after using milk for a long time one would miss it, there would be no abnormal craving for it that would make it difficult to drop it out of the diet.

Some people say, "I can drink liquor or leave it alone." This may be true of some people, or at least for a time and under favorable circumstances, but there are many others, often people of marked ability or even genius, over whom alcohol sooner or later obtains a mastery. No one knows in advance whether he is susceptible to its enslaving power or not. The number of those who are is so large that in every country where alcohol-drinking customs and the liquor traffic prevail the evils of alcoholism become a troublesome social problem. To take the first drink is like playing with fire; it is gambling with accident, disgrace, and perhaps with death. The only safe thing to do is to leave it alone. Moderate drinking is the starting point for immoderate drinking.

159. Tobacco contains poison. Before the middle of the sixteenth century the use of tobacco was confined solely to the American Indians. At first tobacco was cultivated in Europe as an ornamental plant. Gradually its use for smoking, chewing, and snuff spread to all parts of the world.

Studies by scientists show that tobacco contains a powerful narcotic poison called nicotine. There is a wide difference of opinion among users of tobacco as to its effect, but there seems to be no evidence that a sound, healthy person who has not formed the tobacco habit can do better mental or physical work by using it. The evidence shows that the use of tobacco tends to cause rapid heart action, shortness of breath, and palpitation of the heart. Physicians sometimes refer to certain abnormal conditions of the heart as tobacco heart. Tobacco heart sometimes causes death when the smoker is put under severe physical strain or when there is an acute disease like typhoid or pneumonia. Surgeons sometimes notice that tobacco-users fail to rally after an operation as a non-user would under like conditions. The free use of tobacco sometimes causes increased blood pressure, sleeplessness, and irritation of the nose and throat.

Only one insurance company has published its experience on tobacco-users. This company has made a study covering 180,000 policyholders for a period of sixty years. This study shows that those who did not use tobacco had a lower death rate.

In spite of the enthusiastic comments of some tobacco-users there is no evidence that the use of this drug ever advances healthful living. Everybody agrees that when used to excess tobacco is a vicious drug.

160. Tobacco injurious to young people. There may be a difference of opinion as to the effects of tobacco on adults, but there is general agreement that its use is dangerous to children and young people. There are at least four reasons for this agreement.

First of all, youth is the time for growth. There is a general belief that tobacco interferes with physical de-

velopment. Dr. Boas, in his study of 45,151 boys, found that those who smoked were, on the average, 1.13 inches shorter than they should be for their age, and the non-smokers were 2 inches taller than the average. In weight the difference was 7.1 pounds in favor of the nonsmokers. Since tobacco is a narcotic and not a food, this is what might be expected.

Second, tobacco, like alcohol, is habit-forming. Some find it impossible to break the habit, or, if they do, they experience real distress. Many people become so addicted to the use of tobacco that if they cannot get it they are very irritable and unhappy. Some cigarette-users become so nervous and uneasy that when in a social group where smoking is forbidden they feel compelled to excuse themselves. At that point the craving for tobacco has become stronger than mind or will power.

Third, most young people cannot afford to spend their money for such a luxury. Often they feel that they do not have enough money to spend. They should be saving to get more education or to start in business. The wise youth will spend money where it will count most.

Fourth, there is little doubt that tobacco affects scholarship and skill. Professor Frederick J. Pack studied the scholarship of university men, in six different institutions, who tried to make the football team. This is what he found :

1. Only half as many smokers as nonsmokers are successful in the "try-outs" for football squads.
2. In the case of able-bodied men, smoking is associated with loss of lung capacity amounting to approximately 10 per cent.
3. Smoking is invariably associated with low scholarship.

It is true that some people use tobacco freely with little or no apparent bad effect. Probably they are born with

less susceptibility to the drug. No one knows beforehand how susceptible he is. The wise youth will weigh the known dangers of the tobacco habit before making himself liable to them.

161. Opium and other narcotics. Opium, cocaine, and heroin are among the most vicious of habit-forming drugs. Their use leads very quickly to a drug habit which it is almost impossible to break. People who form these habits have become their slaves. Not only do the drugs undermine and ruin the physical health, but they weaken the mind. Users of these drugs will sometimes commit crime to get them. Fortunately these drugs are not so widely used in this country as are alcohol and tobacco.

The opium habit especially has been associated with China. It so undermined the mental and physical welfare of the people that the Chinese tried unsuccessfully to protect themselves by preventing foreign traders from importing it. This led, many years ago, to the Opium War. The Chinese lost and were unable to get rid of the horrible traffic, which was a disgrace to Christian civilization. Recently great international conferences have been held to try to regulate or stop the traffic. Even in our own country there is a vast quantity consumed that is not needed for medicinal purposes.

It is never safe to take a drug suggested or offered by a stranger or to experiment with narcotic drugs.

162. Patent medicines. There are a great many medicines on the market today known as patent medicines. Most of them are highly advertised and claim that they can cure almost any kind of disease, including such maladies as consumption, Bright's disease, and cancer. Many of these medicines are manufactured by people who know little or nothing about medicine and are not honest

in their claims. Such medicines sometimes contain habit-forming drugs, but most of them are useless if not dangerous. Patent medicines should be avoided. When one is ill the best thing to do is to go to a good physician. It is a bad habit to be continually taking drugs without consulting a doctor. The patent-medicine habit may become as persistent as the alcohol or tobacco habit.

163. Rely on good health habits. There are no short cuts to health. The way to be healthy is to take the best medical advice and to form good health habits, such as getting plenty of sleep, drinking milk, eating vegetables and fruit, and living as much as possible in the open air.

164. Health by mail order. In primitive society the witch doctor played on the superstitions of the people; every ache and pain which they called upon him to treat meant gain for him, even though he did nothing which could be helpful. The unscrupulous patent-medicine maker and the "quack doctor" are his modern successors. They tell trusting people that a few doses of a certain remedy will cure all aches and pains, charging a high price for a mixture which cost but a few cents.

Some years ago tuberculosis "cures" and "soothing syrups for babies" made fortunes for their manufacturers; when people began to realize that tuberculosis was curable through rest, food, fresh air, and sunshine, they ceased buying. Cancer "cures" are on the market to-day, but sensible people will not waste valuable time; if they suspect cancer, they will consult a competent doctor immediately. The Department of National Health at Ottawa has done valuable service in protecting the public against fraudulent patent medicines, as well as other drugs and foods below accepted standards, offered for sale in Canada.

The student in junior high school has a knowledge of health based on reason; he has firmly established health habits; but, more important still, he may be depended upon to do all in his power to prevent disease and to secure trustworthy advice, should he become ill. He wants to enjoy life and attain success; hence he will protect his health because he has learned that it is one of his greatest assets in business and social life.

Questions for Class Discussion

1. In what way are we in the grip of habits?
2. What evidence have we that alcohol was a problem centuries ago?
3. What is a drug? Why is alcohol a drug? a narcotic?
4. What is the danger in using alcohol as a medicine?
5. Why is it better, when you are ill, to consult a physician than to try to doctor yourself?
6. Do athletes use alcohol and tobacco when in training?
7. How is the use of alcohol related to poverty? to business?
8. Why do you think it would be undesirable for an aviator to use alcohol even moderately?
9. How does alcohol differ from food in its effect?
10. Why is the use of alcohol and tobacco especially undesirable for young people?
11. What other drug habits are especially dangerous?
12. What are patent medicines?

Interesting Things to Do

1. Interview several successful business and professional men as to whether, in their judgment, it would be wise for students in the junior high school to use alcohol and tobacco.
2. Write to the Canadian Medical Association, 184 College Street, Toronto, for information on patent medicine. Give a ten-minute report to the class.

CHAPTER XIV

LOOKING FORWARD TO YOUR LIFE WORK

165. **Vocation and health.** Some of you are beginning to think about what you will do after you leave school. What trade, business, or profession shall you follow? This is an important question. It is so important that if you do not make the right choice you may be unsuccessful and unhappy all your life. Before you reach your decision many things must be considered. Probably you will think first of the things that you like to do best, and of your own ambitions. The boy who dislikes tools would be foolish to decide to become a mechanical engineer, and the girl who dislikes to sew should not expect to be successful as a dressmaker. Besides thinking about his or her ambitions and natural abilities every boy or girl should consider every vocation from the point of view of health. These are some of the most important questions to be answered: Is this trade or profession conducive to good health? Is it dangerous or does it involve health hazards? Considering my own health, is there any reason why I should or should not look favorably upon this vocation as my life work?

One thing is quite evident: good health is being demanded more and more by professional schools and by industry. Many schools require the applicant to pass a health examination before admitting him. The following want advertisement indicates health as one of the qualifications:

TELEPHONE SELLING

One of Winnipeg's leading newspapers has a fine opening on its sales force for a wide-awake young woman to sell advertising over the phone. Must be capable, ambitious, and energetic, with a good command of English and real selling ability. Must have a strong, clear, convincing voice, *good health*, and an abundance of persistency, courage, and determination. The position pays a salary and commission and offers splendid opportunity for the right girl.

Some of the leading vocations open to young people will now be considered from the point of view of health.

166. Agriculture. This is one of the most important vocations. One third of our population live on farms. The other two thirds of the population depend on the farms for grain, meat, vegetables, cotton, wool, and other necessities of life.

Agriculture is one of the most healthful vocations. The working hours are spent almost entirely out of doors. There is an abundance of fresh air, sunshine, and exercise. Fresh fruit, vegetables, and milk are easily secured.

The natural hindrances to health are few, but unfortunately farmers do not always live in the best way to make use of their opportunities. Although they have exercise, some muscles are not used as much as they should be. In using machines the farmer often takes bad positions that result in poor posture. During the day he

may have plenty of fresh air, but his house may not be well ventilated. Investigations of the diet of people in rural communities show that white bread, meat, pork, molasses, and potatoes are too often the staple diet. Frequently there is a deficiency in green vegetables and fresh milk.



DIGGING POTATOES

Farming is healthful outdoor work

If one will follow the rules of healthful living, there is no vocation that offers such rewards in good health.

167. Mining and manufacturing. The vocation of mining furnishes fuel and much of the raw materials of commerce. In contrast to agriculture, mining is undertaken with risk. The miner must work in the dark and do heavy tasks. Fresh air, sunshine, and wholesome exercise are lacking to a great extent. Notwithstanding these handicaps, mining offers a future to a boy who gets good training and looks after his health. When he is not at work he should use every opportunity to get the air and sunshine.

Manufacturing includes some of our greatest industries. It involves the manipulation of machines. Most of the objects that we see are manufactured: alarm clocks, soap, bicycles, ships, boots and shoes, paper, lumber, and furniture. In a general way manufacturing involves the production and selling of goods. The salesman needs to practice little beyond the general rules of hygiene, but the operator of machines is exposed to special risks depending on the particular kind of industry in which he may be engaged. In certain manufacturing establishments dust is a great enemy of the worker. The metallic dusts, including emery, and marble dust are especially harmful. Chalk, coal, plaster of Paris, lime, and soot are less irritating, but over a long period of time the workers in these materials are likely to get a chronic inflammation of the lungs. In many factories the menace of dust is reduced or eliminated by the application of oil, water, or steam, which dampens the dust and prevents its rising. Exhaust devices in connection with machines often get rid of dust. In some industries there is danger from poisoning through contact with lead, arsenic, or mercury. A factory should be well ventilated, especially when poisonous gases are produced. The lighting should be adequate and seats should be conducive to good posture. Machines should be equipped with safety devices.

The health conditions in a factory should be as nearly ideal as possible. There should be individual drinking cups and towels, and opportunities to get wholesome food, rest, and recreation.

Anyone going into factory work should be satisfied with nothing less than good working conditions. If he has any particular physical weakness, a vocation should be chosen which is most likely to correct this defect.

168. **Lumbering and fishing.** The lumberman is blessed with clean, pure air. The trees, in their life activities, throw off oxygen. Germ-laden dust is scarce. The choppers breathe deeply with every swing of the axe. Unfortunately, however, the excellent appetite thus developed is too often satisfied with food that is difficult to digest or that does not constitute a well-balanced diet.

There is sometimes a lack of convenient bathing facilities. Cleanliness, therefore, is too often neglected. Laborers moving from one camp to another may carry vermin and diseases with them. Such violation of the rules of health is not necessary, since the lumberman can become educated to the need of proper health habits.

Perhaps the greatest need is more attention to mental health and wise use of leisure time. Since lumber camps are isolated, the workman doesn't know how to entertain himself after working hours. He becomes lonely. If he has learned to enjoy reading and good music (which may be received by radio), he will be far happier than if he does not appreciate such cultural advantages.

The fishing industry also has its advantages and disadvantages. If the weather is fine, peace and contentment reign; but when violent storms blow, fishing becomes a hazardous occupation. While fishing greatly benefits the lungs and arm muscles, it does not give the variety of exercises common to some other outdoor industries.

Shore fishermen are usually with their families at night. Accordingly they do not lose the social advantages of home and community life. The banks fishermen, on the other hand, have not even the advantages of the lumbermen. Being farther removed from markets, they have less variety in foods; and they have less opportunity for self-improvement.

169. Building trades. These trades employ a great army of workers, including carpenters, masons, plumbers, painters, decorators, electricians, and contractors. Much of their work is done in the open air and under conditions favorable to health. In nearly every branch of the building trades there is the possibility of falling from ladders or staging and of being injured while using tools. The workman needs to train himself in habits of carefulness and in simple first-aid treatment.

170. Transportation. This is another important vocation. Men who are engaged in operating railroads, street cars, ships, and busses are engaged in the occupation of transportation. Besides the workers, such as conductors, engineers, brakemen, and station agents, there are yardmen, telegraphers, towermen, and vast numbers of those doing clerical work in offices. Those who are engaged in office work, in common with all indoor workers, need to be careful about the ventilating of their working rooms, good posture, a well-balanced ration, out-of-door exercise, and recreation. The actual operating of a railroad is dangerous, — so dangerous that some insurance companies refuse to take risks on conductors, brakemen, firemen, and engineers. This means that for the safety of the worker and others who may be dependent upon him the workman needs to be carefully trained in safety. He should take good care of his health, particularly by getting enough sleep and avoiding the use of alcoholic beverages, so that he may always be keen and alert. Much of the operating work in transportation is so strenuous that it demands excellent health on the part of those who wish to enter this field.

171. Commercial occupations. Almost every occupation is commercial in the sense that it is concerned in some

way with the selling of goods or the selling of services, but the more distinctly commercial occupations include the work of salesmen, wholesalers, retailers, proprietors, commission merchants, stenographers, bankers, and advertisers. With the exception of the travelling salesmen nearly all these workers are sedentary. As we have already noticed, those engaged in sedentary occupations should be especially careful about getting recreation in the open air.

The commercial salesman runs the risk of accidents and infections because he is travelling constantly and because he eats and sleeps in such a variety of places. He needs especially to be careful concerning his personal safety in getting on and off trains and vehicles, and also



A TRAVELLING SALESMAN

To be successful he needs to form good health habits

to use his own toilet articles. One of the advantages of this occupation is that it is stimulating because of its great variety of contacts with people and scenes.

172. The learned professions. The learned professions are those which are usually thought of as requiring a college training and special work of an advanced character. In this field we find engineers, doctors, lawyers, dentists, pharmacists, teachers, librarians, journalists, and account-

ants. Since nearly all these professions require many years of strenuous preparation, those who wish to engage in them should consider very carefully their natural abilities, and whether their condition of health will permit such long-continued study. Good planning makes for success.



A REST AND RECREATION ROOM IN A LARGE FACTORY

Employers have found that their workers are happier and more efficient when they have such privileges

Many of the learned professions are sedentary and are subject to the dangers of all indoor occupations that we have noted before.

In the choice of one of these professions one should think of the chance, in that profession, of keeping in good health. For example, to be a doctor one should have a strong and vigorous physique. The practice of medicine is usually trying. Calls may come at any hour of the day or night; the doctor's meals and sleep may be quite

irregular, he has much responsibility, and he is under great strain. Such a profession requires abounding vitality and a naturally cheerful disposition.

173. Personal investigation of vocations. It is impossible, in this brief chapter, to consider any one vocation in detail from the point of view of health. There are necessarily many vocations that have not been mentioned by name. It is desirable that every boy or girl should make a personal investigation of two or three vocations in which he or she may be interested. Little has been written on health in relation to the choice of a trade or profession. One of the best ways to get reliable information about a vocation would be to interview people who are already engaged in it. Here is an outline which you might use in such an investigation:

Vocation: -----

THE PREPARATION

1. How many years of training are required?
2. Are there any special health risks involved in this training? If so, what are they, and how may the learner meet them successfully?
3. Is there anything in this training that is especially conducive to good health?

THE VOCATION

1. Does it involve indoor work? Does it involve outdoor work? State the proportion of each.
2. Is there any special liability to accidents? If so, what are they, and how may they best be avoided?
3. Are there any other special hazards involved? If so, what are they, and how may they be avoided?
4. To what extent is good health necessary in this vocation?

5. What defects in health might one have and yet carry on this vocation with success?
6. Have you any special suggestions as to keeping physically fit in this vocation?

If one wishes to enter some kind of industry, it will be a good plan to visit that industry and learn something about the working conditions.

Questions for Class Discussion

1. Have you decided upon what you will do after leaving the junior high school? If so, why shall you take that course rather than some other?
2. Have you decided upon the trade or profession that you will follow after leaving high school? If so, have you discovered that it has any health hazards? What precautions shall you take in following this trade or profession?
3. Describe the conditions to be found in a sanitary factory.
4. From the point of view of health, what are the advantages and disadvantages in farming?
5. What are the opportunities in mining and manufacturing? What precautions should workers in this field take to insure good health?
6. What are some of the trades and professions not mentioned in this chapter? What advantages and disadvantages does each one have in the way of healthful living?
7. Why should everybody give a good deal of care to the choice of a trade or profession?

Interesting Things to Do

1. Ask men and women representing various trades and professions to speak to your class on the advantages and disadvantages of their work.
2. Visit some factories and report to the class on the conditions.
3. Go to the library and try to get additional information on any trade or profession that you are seriously considering.

SUGGESTIONS TO THE TEACHER ON WEIGHING AND MEASURING

1. Every pupil should gain in weight and grow in height through the school year.
2. Children should be weighed regularly each month and measured three times per year. Height should be taken in September, February, and June.

3. For weighing and measuring, it is well to follow these directions:

Remove outdoor clothing, shoes, coat or sweater.

Take height with a square, consisting of two flat pieces of wood joined at right angles (a chalk box will serve). Place child in an erect position, with heels and shoulders against the wall or wide board upon which has been marked or pasted an accurate measure.

Be sure the scales are balanced.

Have child stand in centre of the scale platform.

Take weight to the nearest half-pound.

Take height to the nearest half-inch.

Take age to the nearest birthday.

4. On the next page is a sample of a chart for recording height and weight and also a graph representing the monthly weighings. Every pupil should be guided in keeping similar records.

5. In making the graph the pupil's weight in September should be recorded on the broad black line at the left of the X. The numbers in the blank spaces under Weight should then be arranged in an ascending and descending series for the following months. Each month an X should be put where the weight line crosses the month line. Then connect the X's with straight lines. The slanting line will show the growth. The form on page 182 may be copied by the teacher or pupils.

6. It is the business of the child to grow. A continued loss of weight or failure to gain over two or three months should be brought to the attention of the school physician or to that of the parents, so that they may seek the advice of the family physician.

7. The teacher may aid children in growth by inculcating habits and attitudes of healthful living. Among the factors favorable to growth are long hours of sleep, play and exercise in the open air, and a diet that includes a generous amount of milk, fruit, and vegetables.

8. It is more important to know that a child is gaining than that he or she weighs any particular amount at a certain time.

The teacher should study the individual trends of children.

GROWING UP

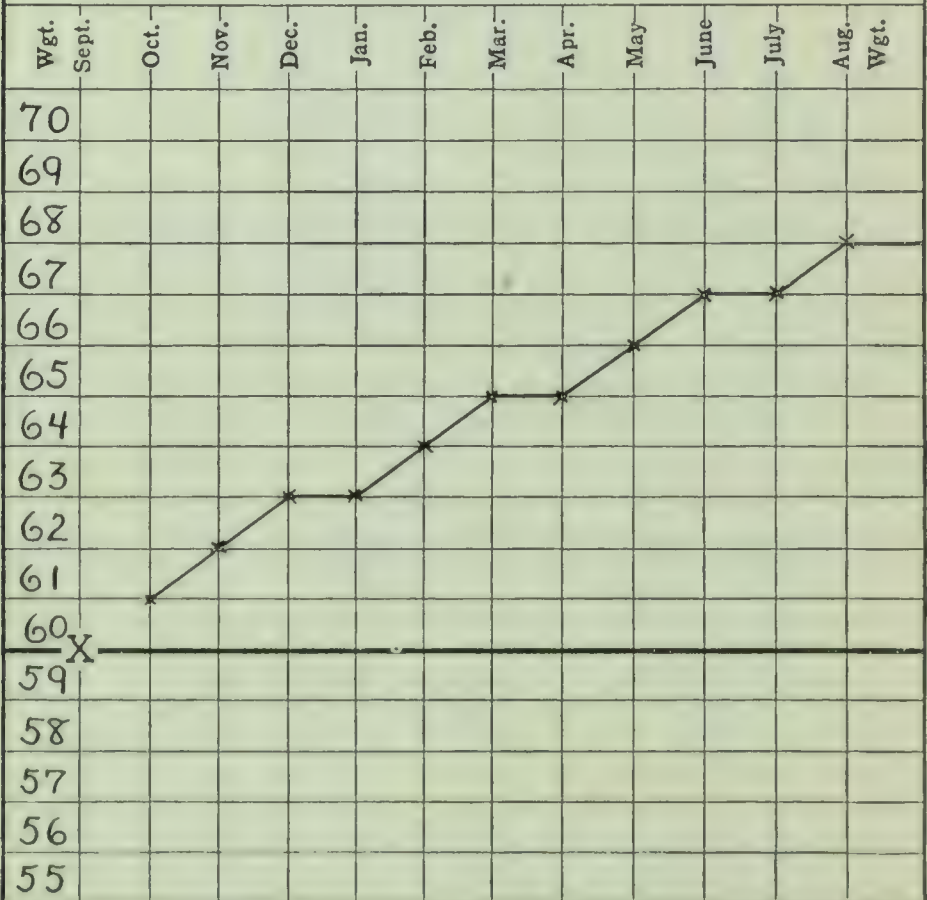
NAME _____

DATE OF BIRTH _____ AGE AT NEAREST BIRTHDAY _____

_____ 19__ TO _____ 19__

I am Gaining in Height and Weight

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Height												
Weight												
Gain in Weight												



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KEY. *ă*le, *senâte*, *ăt*, *câre*, *âsk*, *ârm*, *fi*nal, *all*; *ê*ve, *ê*vent, *ê*nd, *hê*r, *rec*ent; *î*ce, *î*ll, *admî*ral; *ô*ld, *ô*bey, *ôn*, *fôr*, *anch*or; *û*se, *û*nite, *û*p, *fû*r, *circ*us, *menû*; *f*ood, *f*oot; *ch as in* chop; *g as in* go; *ng as in* sing; *ŋ as in* ink; *th as in* thin; *th as in* the; *oi as in* oil; *ou as in* noun.

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